Laura Fermis Hand Copies of Minutes of December 10-12 1956 Chairman Prof. J.T. Zacharies

December 10 /1956 Agenda Tuport features 10.45 coppee 12 45 lunch Duner 6.30 ho after durier arrangements but true free for informal discussion Cocktails before Let us Stick to syllabres By experience to we get philosophy & psichology of educat By experience, this can be done at ducier - Sou Various groups, with syllabi So Friedman will begin with our syllaby Then Cornell Allinois B X. S Cal Tech Bell have has made film urth thip

Starting point: debate for pedangogio reasons phic & wave phen provided advantages a lot suiple, have seen. Their gross observat evough to have them started but there can go deeper Kuerreatic description here. Examples with wave treatment flrough film technique no lange amount of math. Long session of optics: phenomina and underlying picture. They get something of how bootles move, to we come go fast to dynamics -Under emphasited. They come to opper too late to understand wave picture. So we make them think in terms of waves Bethe how do you go on? Friedre : yes ni oppies of mechanics Optical phenom & waves no dynamic nor wave formula may take up to half course -Short how to surplify, how to unestige

Kuremadies runs beyond, undo the woterin of bodies (throwing preces of chalk, low and arrows) you spread knowadic and gros on dynam 2 motion of lodies & dyn huein 10 electricity & magnetism blyn the fie back ballistic fie destric field fe fields (not math or Faraday field) Short quile thart use 1 & 2 to allack Submicroscopic Physics - Arms tra Usung wave z degn i geometrie. Emphasis in rechlinear buildes. reflection budly repraction first thring slow to not statem in book that mides cates is constant. Then we play with it: miles refraction relative Total referral reflection

Loonis; at the beginning no waves? In ionly empirically Leuses from this phenortiena : as technical application: exclic mature of physical science: technical application their back to science No theory behind all this Loomis! How much the activity of the sustent? Exposition at first we do without algebra. We do not thunk we shall have in fex of or fue to ... In problems even more than is now in texts, and we could lead them wito redracing - to in problem their would de sourething new & Tu general with their ni class, book of moire very much cut out in course. Kossi; also short monographs to expand various points Fried Movie will enable to do - participale by showing snieple things. We should Mundate interest in things to do by showing surple things in felier

Hick have wereuphasopped direction of hight Historical examples and controversies but not printive man Iscurral pictures and see what they fit, and fut prefuses So Nº 2 is a check list redocity. it takes Suie for even light to propagate wave pechine: you build up a lot of prefunes that they don't know V3 we have to take > time of emphasys. a wealth of pheismener of ways of shouring which we should those : loughedre ripples acoustice phenomena

major defleculty: both preferres toucenthat explored: splithing restract & reflect chard with bullet theory rectiliarear hard: bot around corners Restulerference phenoming Ripple fanks playing back & forth with light - defference in scale wave length Qualitative explanat fairly natural Interference: Handing waves? no all in morrieg waves, and end up with stand. with less emphases flow in books. Luestion: it bothers that you wake uchamail examples béfore mechanics For I want as amples quantitat, not quantitas but do as want to exclude things Quest Paradoxical to Hart with to do not see light & things Kali auswers the phenomena are familias It is an introduction ut scientis

Show that in lab you can see physon correlate by smil much, the mass

Second level after they know They know a lot about physici if they know how to order phenomeno Dynamics abstract from experience Lusteri : example , exercise orelevant, more Careful elevinas of another This has what is scalarce. It Conclusion, then us resemblance with Hunk is a fraud to make it I teaching as of uductive method. If me says tach: blud alleys - you have to point there out. world many embury to do; the fraude is for dring growing informat ne length of huil - at this time not discuss whether ophic waves are > or Concrete there Morrison to waves

Starts side 2 There are things we may not have in this Kuid of time schedule

Major emphasis here! Newforman dynamics.

Trad clean up 16t. Forces predict motion

From materia go back to forces. Momentum

Placelary medion you get forces from

motion

Conserve momentum

Kruetic Pheory of gas notion

From Leo from light presse notion

pressure other interactions

augular momentum

You have to develop some electricity 4 magnet before you do balistic charge Coreland law macroscopic bodies lette peth balls, uistead of electrons, first Some want to de emphasize the structure of matter. Not driving to hard We are working on (Some we shall have done earlier) Kuretie th balistic Conservat ru corruic rays wave phenomena Existence of unit entities blectric charge Faraday Millekeurse perhaps historical Att Paulin General chemistry atoms using wave ver & De Broglie relationis Many of loave worked on parts Suffe Rossi - Various parts - & creamed Michels put in presentat

Dyn Gottfried, Lugard, Rossi etc. hach If we go through all we thall know where to attack Cornell Haus Bethe. We deviate from traditional point as much as MIT But had 2 chemists who wanted a physics-champtry course for 2 yrs norther hero 1 yr course Chemists & advince physicists to they fell dassical physics later and start about, present without much foundation of students who will never touch physics & chemistry, who will not fake a further course and would be obligatory has idea of world around him Not use inductive method or purpose Will not deduce laws are comple mendary to MIT

Small numbers of large numbers whatevers weathers measures 2 widence on matter quantitative, geogr counters scribillation trut mage meroscope where you See an atom, crystal surface, how arranged. Weigh amount maker in monolayer - If more surface not miform Length of a molecule (ling hat order of many qualitat Kniet theory there are atours - now pressure, Louis quantitat proportion to number of atoms, to velocity Use some examples over and over · Say ruly more tohan proport to v Temperature C) was spectrograph not explained field) here. But assure people know if 2 poles, smething happens, deflection & Futroduces quantitation differen masses of particles through deflection chemistry, building molecules ustops

We want to discard historic.
But at end fustorical review Monore multiple change at this point Dethe later on, here nothing

Surple formulas even to marrangen
of afons in different molecules sourging

this has something to do with geometry mass spectrograp Standard examples Particle Mechanics no states no mechan of big bodies except as illustration Speed and velocity by means of graphs - suigle mot acceleration thou forces I & 3 law of mot later 2 Illustrate No forces on macrosc ti electr field - turie the voltage

bundamental det Cornell: act of faith difference in aim Structure of matter Question primitarily not of the how talence works

MIT development thruking

Bethe fill in a number of points later on

Took Paliline chemistry as example, skipped

many steps as physicists we would like it Frank Why frection Morrison point out real world Wheles : then why not elastic forces? Bithefeeline we want to counter crificism rather than discuss these things E Dynamics Something besides forces quarden theory Formula for Bohr's radius, without Sayue how derived Is first withoduct of h ! there are some resolution condition to h - - much later withe course will take it up Lucray levels. Aphial measurements as a possibility, as consequence of quantum theory Tutroduce h again fust happens to be the same Wave leveth for first him

By We do not want to reglect educat side Crossel it where gets us too off main luce We would redroduce I by Rutherf experiment some particle mechanics and how and how. dessory at time hosley only certain elements available. Filling in elements Loonis you have to mention that space is empty; electrons much smaller moss B can do second with mass spectous f ancleus. Should expect that every goes up mono notion of charge will have been infroduced with mass spectrograph We have Contomb have periodic variations. This is how we surring

first [(mon fu Z); then we take I from Mostley hattern. The hatt system Quest why not show sumply that properties of dos chemic elements vary discounts B want win that potential B we have already the diff 2 possethlety argument Louis & Logical Chemistry in Rali Question of principle; whether their is actually a course on how world works, for murial course Can be do huself - does too underston reflection of scientific the culture - Will have scientific angle. Will retain any porteon?
Will it be a memory course 2 Coherent point
of van later Power of making analysis Lucission of spirit later

Cornell man in chemistry Fad number of Syllabres far away from adequate Students are ready to accept atoms of molecules. Building up a consistent series of arguments, you do not Rossi You ought to teach them language of science, not translate into their language. been presented in this course. The principles this Our of point of view is that we must write physics and chemistry—
Bethe in one yor hears about mafter but not about waves— 1 yor picture 2 molestandene Michels - idea of coult 2 fundamental philosophies Concell man: in 2 yrs in possib we can confirme Cheunstry & physics only if we start from afour It is plausible if not logical muarily want modern physics & chun

Are there is a really unterweaving of chemistry & plus.

We should have this Knied of structure at all levels B Perhaps it would be bether as a 2 yr course in college, so we could add defaire We might have 2 afternative courses 2 - Frightened at first presentat Scared Students are not inferested B 2A - you care let obein do a lot of experiment, even bruild a Geoger counter Loonis methods of participation. The easy oue have been left out Quest Bear in wind : there are ways of Abructure in class room organitat of mechanic of learning Must be related to tituat 2 wit people who take these courses way become comparison with engineers; the not for from a nullion

Rali process of learning but proc of furgetting Very few general principles, bow much can be retained I we have not thought much of the ability between various part of physics Coherent Rali Beyond Nº & Buy are have not been discussed by the whole group of different Johnlife. Marrison and yr 9. Oppreach Vibrations and Waves difference from MIT Ver first waves deductively applicat at very end outled akerthout fourthing could mily mough to mitiative of it divideral feacher hast chapter nucleus - ought to have in high school

Afternoon Il 8 or to met weekly. Discussed problem Have no syllabres or beginning Prepared several syllabo - Stuck to one for a time (rather conventional) discussed where from here so wrote several first Chapters - Found syllalus hard not been of great help; their chapters have faults and a all are ferrible may be all right The whole problem harder than realized Harder than exposit for higher courses. Left out the essential migredient student You ought so have day by day contact with student-Loomis hastseen 9th grade 3 succeeding grade They have two young men - not encinent math Enthusiastic under judance of real mathe madician they are thomas out first we their own high school - correct, eneedat day out again in other schools - Learn a great deal about what can be done Fuid more abstraction

This they do in a subject easier to teach than physics Lach publisher re-writer Loonies - any book along lines of 2 presented may be very good because radical, but may be more hard to to teach. On experience of a textbook at college level most of teachers consider it too hard to feach. I more point , we of the unportant part, effective man to have students absorb is to find new path must have new study of how to get student particip Some of our people spent much fine on a Other on their on Due worked out This - Other on their on script of a film on motion falling bodies - Combine with stroboscope as the place where we can make most experiment

2 - mon from the.
Thought mice if at end of course we could go use atomic physics. Give the an minin Bell Lab 1 yr? 2 yr? Considering reality: MIT no chemistry repre Seulation at all. Bruig in chemistry only where overlap like knietic theory, electrolysis Contrary to Cornell idea, we do not want to have out potential screentist, hoping > fraction will decide to go on So sylbalry must give some experience of tooks & wethords for those who do not go on Freetrads ui science emphasis pacifion. rather early to weekamic early - Disagree with MIT - Conservat of moment conserve every, talk about electricity. So this early but overlap with afones: perhaps in 2 weeks what course is about, structure of material - So we go back for unstouce in Kuretic theory, pressure what does it means ? Electricity through atoms & elects - Then apply augular mondertum

The grat not only beautiff of physics of nature, tal not all in furth understand of realists Some peripheral parts of physics Michels: do we have to be tought the peripheral answer: may they They don't have to be uicluded, but they don't have to be exclude Lack monographs (norreson's idea) If colorwebry considered superfaut we may have a monograph wither on Subject at the end of these day we should have a list Is the Cornell view to have the course in form of series of monographs? Frank Bell hab more close to Loomis wish Why statics considered best place for conservat of every: Bell Lab , through surple machines Rabi. The problem of the congressman does not hus we aufthing about science. But it is What we illean about scrence: we physicing we know little abot chemistry, but com get together with churests and tout

Same culture not ofter hard some Knied of experience and some science, but the way of thukung, approach to problems, has not gone over This is one of the main ann of the course: modify the course of culture Lu Kris & respect all outline fall thort. They do not connect up to make the war who is not grue to be a No wersion in this culture. For us part of this process might have been drill-We have not connected with historical this end in view Rossi - Duestion of home - me example. would like Pfolemaic Rabi I do not care question of time - Even
if more subject matter, provided we bring
fudgement.

Rossi - much of the material can be ni monograph
Friedm: ni movie you may show some episodes
and at popular books.

Tach some hobody knows what knowledge would be if thereis had been done defferently may be Rabi's point may be

got across if we do several things, like , is wonographs 2 storne Text could be in several styles - would be in keep with what to do In subrence scopie have for atom then use wodel you had wade to show all we want Head forward afour, and there use to explain solid, liquid etc.
Heading ride theoretic and experiences
very closely. Cheap equipment: As a subsection i wave mechanics and work to go wito abour. Then have model Friedman: Hering macrosc Man & Comell: Philosophy of sc. as methodology Experim 4 Theory. The 4 make up source. We cannot do them all rules we do very little pieces of screwe - The alternative is to take one Bell hab aware of Rali's points - But we reflecting how to teach; found only by examples Many high school feachers will not see what physicists are. We right to Hart talking about compromise soon.

Michels: is science or scientists part of the culture? I thruik the scientist is -We build up gradually scientific infurtion Cornell was frying to bring whenter before student was ready for refutition and to was wemorehation Luck Give details ni rue excemple. Drug very arle wen with 2 yr course we cannot gue picture of science, But we can un prove at quality of articles etc. Goldwasser Greceson We want to put much more There should be secure intervoven in all other Subjects an educator in much afterupted to do this with good results Rali _ Hg opportunity to talk of high Sche educat homis we want to put in cruise ideas we do not of timber express ourselves. In and you

Bethe agrees with Rali brut one to give the feeling you have to have something on which to give the feeling feeling in life of Goethe because I do not know why I should be Suferested in science first. Then take I field and describe approach, give their Idea of tolidety of our view. But the Subject matter is unportant. Bu So un portant modern physics Amon i High school want what Rale Land Drit Know how Would accept any of course is reduced as feasible! Fartors in Africture of Carming: assume that Africture of science is haunered put 1º fact is feacher - background - Fiferage better grounded than of physics 2 substitute teacher or give him better tools? 2 Curriculum. subject. May be ought

3 terrie Ichedule sure of class - spectrum of abilities Demonstration 6 Recitation. In Lab 30 children doring Laure Huig I Laboratory itself now is cook book fype they know already what they are expected to do - ho exploration & Extra curriculum activity Present courses in perfect. Basic is whether we have in week top 10% or 20% there is Lack Preparatory work at MIT Cal Tech Whaling only survived Booked on phylosophy 2 or 3 ideas: 1) wath surphasired 2 what is not known; somewhere you should say these wodels but may be will 3 do not slight engineering for ustance fluid mechanics is attached to to do ourplants so we would like

They are more interested in kehnology Lyllabus 1 Mechanics 2 Kuietic theory Bell Labs very surelar

1 - despl, have vel, evec

idea of differential calculus

Of Cal tech we assume that they have had lo physics Lach : only assumption is that students will be at Cal Tech Green want even more technology asle If Dubridge were to describe how a refrigerator works, would be different And from high school texts. If physical principles of refrigerat, then OK, But separate mourson Impossible to explain refrigerators + places, not ever Feinman Cooper: bremendous interest in ideas if teacher unhusuastic Koich: film ack out something, but their somethings must to be said by someone feeling deeply Loonis Copernicis, Prolenny would make a beautiful film

Osborne sympathy for refregerator - but must show he has not set his own experiment There White his personal Hory Journalest assigned to physics learned about physics was getting infellectual stumbet order his life he had learned about Shirit & bates in witer af methods bether debates in witer of Jubyect matter useless value why people wiferested in a coust, To course should do Phinis Rali Laid bugh Ich should be exposed to unaferral not very in portant which. So welleral premiary aspect not subject matter this or bothing How I don't Ruow Shore of subject should be subordinate to purpose If too difficult, mut of question refrigirator teacher should say don't Rush but care find out I am trained to find out

Purcell : they should Know there is difference between scientist and screwball Greeson; temporary source; thou that with hime they change, transment; that does not mean they were wrong. Rali Science is process process Conopessman again Triedurare
Whaluig Conaut's book
Rabi No dooned to failure all aurea of the period nearrison - the miportaine of the net work, the spread Bethe historiadion you (It Wh) were assugred for his se 2 technological motivat

Dec 10 Cambridge Friedman Optical Phen + Waves Motion of Bodies true Dynamics 10 kgs + 3 of weeks E+M 5 " Field Sub mic Physics 8 1 Deometric agties 3. 1 Regularities 5 2 Model 6 3 (Cytrapolation) or Getension, 8 4 Limitations Cornell 1. Unity of Physical Science Y Many indep arg for one law.

7 Ded of phen from laws Math Conflicts 9 New Models meldede the old 10. Controversy and Content in a

. Some of it before Mounthic balistic of Small particles conservation law fields Cosuic ray wave phenomena of small particles (without analytics - then ogo back and analytic) existence of various kinds willillikan's s Faraday's experience afours and molecules gay Lusson faraday chemical afomistic Turas spectros copy Tota of adomic units - Lee vitegers even though crystal diffraction and abstite counting wave-length with your own lattice elementary way duransions of atom. number included in thickness of film election microscope intermolecular forces - liquid vapor equilibring

Lachs pourts 3 and 4 (michistoria exclusions) Jobs do be done If we have want points of agreement in b weeks or 2 no we may have another meeting. 4 first What Who When last night Projectors: most pour. We have to take care uof ui Phis group Purcell will. Placards: many things require smultan view of several topics with subtopics convergence It would be use to have paper printed in color to be put m wall. by each step fest Subsideary testure and already are schools in the area forfared to lest Loomis Separate things in what has

most important points of agreement Durinsion mass spectrograph. So early there
thould be one in each school
Friedman Personnel. Where are people. Who To high school people who might be available Scople on churches of part time rather than Five groups : uncertain about Cal Tech. So 4 115 Connell alreast nie possible so get so

Brandwrie - let us talk ni serus of thrugs so glo

rather than time People could work part

time, some session arle: a couple people at Ill, would for 2 yrs Maisfers : 2 types of tasks. 1 or 2 require priority
and Knied of polis
if tylkalous is agreed
usawy of other tasks come be assigned
to molurdual on contracts, by part time

Ouce sylladrer 50 people from all of vew que by out. : are you arming: I book combrided from 5 groups 5 books? how awkward this would be suppose we could agree ou 5 things Lach we would be bress for a while We would stew about miplications of combried course - Oscillating Loonei How to slice work ! hach due groups Bethe. Tach perhaps MIT would prepare optics axle does not see why by subject: its Tach: no you wife book does not carry of then is given to film people asle "I would learn how to make film Looning agle question can be postpoud yet First some work on the fext Braudiense homis to and to has thought about a movie hach the He should make it or his spirit is

treduce. MIT would like to do many be this is starting point for to continue on offices way & mechanics syllabres syllabus. draft of tests film treatment Trial movie" still shots, ai andis visical lype, and run tequence without debails of profession filming It is very accelitions there _ Tach Continue Optics waves quechanics Di lo sylkabis draft of fexts freatre moore Trial mioure set some viteract with high-school people (2 people to help us vivent, not to much Hesting) In this descriss missed you must build waluation, when scientist is right; what testuig do you plan

Loomis; axle made tame point Chaurcey: Examinat of fests - People who are doing work. They are the ones who ought to route questionis Verribly wie portant to thuck of examination. Some time when exam you find you have accomply across with the hids -The questions must be made by those who develop course. We can help by showing sample questions along these luis. Loomis accept, but what surprises me you want questions before fest. hach In order to appreciat what Chancey tays educat exains thysics thick of examin in terms of long hange goal - Variety of long nange goals most of us feel it would take 10-20 ys to evaluate long bern effects. This not dalk about now het's see what can do with tools Loomis you want some question who would greede hi 2 nd edet

Chaucey: yesterday & boday revost of discuss Important not this. My feeling Lorice parts > miportant some > ready for developing Cristent wie portant brit i element. If you do that you brild a Screenist without explaining - What Kali said: you are trying to develop new thought process; must be spelled put vi exale as content. Kind of thurking (group) ablety to identify of delimite problem

Suggest or recognic brypoth

procedure of formulate valid

recognize or formulate valid

conclusions

to apply low to familiar

structures

9 cause effect relations

There whate to the Knids of mendal process that may be permanent residing rather than facts learned Mendal processes, concept principles should stick Congressman more able to judge science Plea for shought to what each topic will be in developing these kind of thought are you suggesting this will help in evaluat chancey: evaluat would not be able to tay you have bough made what you feach understand Out hack testing on squidents. Must have bourage ready before we try festing Reading questions we see it is possible to fuid out whether chancey Testing can be administered to thedents & also control group who did not have fourse. Brandwie : also testuig the two approaches then & phys separate, and niterrate

When prepare questionis? channey In 6 months, but if we have codeas Loonus: has anylody use defermed whether those objectives were accomplished?

Chausey: not widely used yet Friedman; Optics waves of wechavies we want to overlap not necessarily (group recruphasine wi ferm of amount work to be done, we cerdamily will not leave the rest out, keep on warring. We have to have cooperat with high Holdwasser

He Felix thought in ferrus of wechan
e heat as a paskong. We don't threed

to what to Hart or 2. We know where we are going suft if we agree on objectives. Is the objective better understanding _ more physicists

general outlook _____ hach it is for 20% or it is bad if for

Most Scientific approaches somewhat different from other wellectual approaches Mist be wederstood Russiairs ruay be they will have another industrial revolution - It does not matter. Loomis. You address yourselves to 20% in any case to objectives un'upordant. For all do same thing Fredrian same porit : has thought : same to those who will go on we scrence and morison had lousy education.
Frieding & hach 'we thall do the best anyhow.
Too different to do 2 things de Frankrie group is powerful Should not do thurs lightly are leaders. Fort Tach 20% is students who are now taking physics Braudunie You have are falking of phys in 4 ways the busicists Jos housewive

Brandwie This group must say something to Sustain physicist hoomis. These people will revite test that overshoots even trightest students. We reed high toh teachers. Not so Stranderie this group should song: this is what we have in which But Hade as other types of physics are fair. Other groups can develop other types of physics Loones ! have no whilst in educating congressive but don't receid dones it accidendally as le rotting we are triping to do will différent or 2. This will come from testing Suportant not to make decision but would be important if we could have niformation! how much mate with a certain IR Sopro ald this program Lach this too lechnical for university physicist lets shoot, then try and see

Let is ani at 25% who take physics of these 20% of the 25% gp on ni scrence Bauer Some ui plux, more ui chem Lach : you must they Bethe un pordant to know we do not anin to 100% - ve do not ami at 1% hach. We know if we aris of 25% we do not harm 1% too much Brandwrie if you am at 25% you can refresh your math as needed. to doily. Chaucey: N23 is the point to work on the rest will come from here. This must be the best.
Thing to do put down topics do the best can do. Then see if it has chem or more plus -

Lach; follow suggestion first voiced by Rossi

that we may agree on what must be in

Is there any one who wants to say important

For get the way the first An get them on first Rach Sparts on Cornell Syllabus
I any discussion? Do we want as separate subject? or wherever it comes up Braudurie: topycally teparate, but in feaching A A & M all we yes B) Kurehi Sheory hast view i to lead wi chewistry

Most there but perhap leave out mixture if us chem wheerated Loomis you have decides whether you do atoms as combrued weights, if for chem or prot, news & electr of physics only

Zach C which are must? certainly in Ic 8 ILC The a little lit 1,2,3,4,6 C4-59 Rossi suggests elmi nature electric potential 肛 nethe wants it Bethe popular every So omit potential last not potential en use electron volt but not volt TV A and had B rest (to Ruthers melissive) VI makes no sense if V has not be done Rabi it is good third yr course if we have had dyr course first

Bower we do not do them thoroughly
Fach no all we do we do thoroughly

Discussion I saying against kaching Rali against Biener Rossi leave vi in zy elminate some Discussion: what we had agreed that some things would have to be fought thoroughly and some less thoroughly

Braudurie Course must exceed classroom. We should not give Hud idea that they learn coll from classroom Loomis Kuetic theory of gas : 3 levels

hres & temperat

Bethe gave supplest yesterday: qualifative

2nd more quantitative 3rd and which were advanced, which Rabi Jays takes a yr Bethe: we had in unid the second level We had in unid Bolthman to point that not all atoms have velocity Tach back Cooper; we had several subject tempharvied, others stated. Lach on board both those to be emphasive and VI A, B (debruise) Tach x Bauer notion of solution is we perstant Rali: Hard to explain even in college hard Bower: level of alstract Rabi autagoustic

Lach: we agree -Cooper voe if we want chem in second yr we should leave it to chemists to say What they want it macilers, make the assumption first whether chemistry indipendent or nifegrated 2 gr course hach I some worry about VIC Present y course of plays or chem Bethe again for the right side the chainst will have so decide are you concerned with subject matter or student. Keep in mind students hack habi you are forgetting students hacter argued already on aires Loones are you planning so college can count on them to Ruow smething, you say no But Luce you deal with Hudeuts, you change them and then the college will be able to court on them knowing Braudwine axle is that physics on right hand

arle. Then if it is chemistry goes automatically Looner thurs must go like Newform Looner with hat on blackboard will not help Brouder ne lets go ru ui your bedeerled way

VI, A, B, (C-7H)? (descrision of 2prol half of A - doo hard A (1,2,3,4) for chemistry have theress lake magnetic forces or moving charges some of the rest of VII B/3 C/6 TX A i subject to treps A 2, 3 (?)

diadron on dedail a bit of

Cs(half) at Foreduran wants many examples all of C1 a bit of Ca rest off alto gether Friedman on Done must decide whether one D3 D6 F F

meeting 12/12/56 Yesterday: how chossing subjects Lorch Learner out heat and to on There were informal rulefungs More experient than disagreements Troubles , Some people fakung Rati approach (Rali (Science laught ruany more yes) B & presenting a lot of material case (Bethe). Call it Survey course West of us for infermeduate position True of the topic in full defail leaving out no appropriate step, but also some things with us detail : takes too Province to say how we got rucleus
Priorison - It fendency forward this line
hach talling that monsters & Brounder sympathetic to lake longer fuice -Predominantly survey & predominantly
Rale - Let us leave it roughly - 4 2 to later we shall have better feeling where we will have stourted to work on

We way leave Rabi unhappy hach and churches whappy axle if Rali & Bethe would write chapter they would not be too different Bethe in casy to go to extremes. Rabi Bell Lab man. 2 topics a la Rali maves milman, wechauses (& fuire) the rest ou furvey wethod. Fredu We got to pourt these most lekely Some Countridge view: picture of aformics we come closers even in subjects. So we come closer to writing same thing Lach vi 5 number code off - 1 at blackbard ryr vs 2 - combring phys & cheen Friedre feels strong Tempressed not now wholestake mostly of phys -How keep from freezing to that we Should we not arin at what we do for 11th grade rather 12, and encourage Bauer & do something for and yr also have throng statem that we want

Integrated course of 245 - So we could under into first, Shift some of the Schlichter The solitary presence of chemist. It should not be a separate undeavour. We thould bring in more chewests of education. Describble physicis first, but not 2 separate groups working in Lach can spend some on chewistry; would be hustake to exclude them but some mita two must come from chem, perhaps from those who have been here! It will not add much burden to physicists to reise program, after chemist done their part axle cherrents could travel aroun Tac no discuss on this Bethe With people we have now not posseble good job on integration Bat to preclude rifegration. What we want now is a mabure course in physics - Milil we Lee mature course in chemistry of dolvo cate Morrison We are reconstructing, effect

on long range. We cannot re change every 3 or 4 yrs Lach at this point hand to know whether we arrived 11 or 12 - If not storm let us not take this point -Som We want to appeal to 20% We have districtly 2 disciplines, 2 different appeals. So disfuguest in 2 courses -Brus Rossi - Outline according to ideas, concepts and facts Ste llo ougler 1 Struct of matter from 2 agous 3 Mechanics 4 Light 5 lectronagnetism) respected for a liquid for a crystal conductor - all of this qualitative with possible ext of Kin theory 2) how large at how heavy, nucleus and electrons (Rutherf) tex of mucleus and its charge

3) merlia, ft = mor me 1 am 3 demans circular mot ni some defail Planets great stress Conservat of the back to gues ets. hands gases (acoustic) - Discuss interference in detail + leading to ? how can we measure à is mi port 5) Change & Couloub law masfield qualifatively, not compute fact Examples.

Brether F= E E + xB

Conductors (from Lorenz force) Lust. Creat & auchilat of matter should be ignored reaction, chemical of Tack already too much het us chew now of this There if we see we and we will

Ross, - now let us try to subtract, not add haster agree on this outline Lach We shall have monograph: one on unclear reactions. Role of feacher role of aids. Not purpose to present everything I you worry rue with witten would Each. The list of other devices 2 Conductors, crystal & liquid removed? Rossi Duly a few runtes, just to say Cose We talk about conductor wowing in vignetic field. Cooper Do not leach them separately - When gou come to it you mention - So struke out hig cryst & coud me 1) arle T. as KI 2. of Strike out last ven in Em-Rossi The 2 last lives now are wofors of novusor canoser: only kniewat of waves, Take of thrings of waterials

Bethe What about vileation!
Oudieri. Like Vilrationis better than
geometr opt
Floor: no. Zach: Some manufacturer may tupply
good pamphlets.

2. electrons are really particles and
hight really waves? Rali Do you have light quantum then no posit to take De Broglie Rossi Compton effect & De Barglie wave? Cooper - would like 2 theories & how came fogethe Bab. repraction Rossi . chapter at end with all these difficult things 2. We are unmagnative - Gucustion the high the level & graduate level Rabi - We want to leave Hadeut with clear Worke-particle beautif story but extremly difficult toubt subfetly can be to Salisfactory to high the

wer at graduate level we leave their musatiffied. Theory of measure and Cooper Just Because subtle idea we thould graduate level ist that they had usterposed morrison modern physics is that contractore dictory exists we cannot leave Student idea that everything is clear Rali by clarity I wear that they would under Hand what soud. Wave particle is welsolved, unfrieshed So will not be furthed for Hudeut - Would take very very long full - Woold weed moment, yours's expension. light quantum sure too. Con be done Double you can give that background northout changing all outline and hethur much more about Marsters Lute possible that student be satisfied by 1 exper and dissatisf by other learning goes on. May be sabiffied with Siell law- a few weeks lafer encountering interperence may have est problems which distaliste

The 2 are compatible Possible to leave hui dissat Roomis 2 crifusions: steedent's & that of modern physicists After ui terference i dea. In hight would have to have uniter of examples whereference hight quantum compton effect. Particle dea : resolving power of reverse lens etc. concept of measurem of position. Lenses, what are you oping to cut out. also thow that dea has applicat. Go back to atom, bring in Shroedinser. m Shroedinger _ Lach Fortunately we have candidate for wifing to within this present frame Tack ni coffee brak got idea should discuss Frank. as I looked at material I wondered whether every body had colea of correlation of these subjects What are yout druring at 2 him

Tach: full meeting landed with hale out Rabi thort Rabi: do not would be lecture child's about philosophy of attitude, how usested in demonstrate phenomenon Repeat experiment witch puis to have here accuracle angles Make list of Huforical point: Greeks had alrue Plot augle of maid offer angle refract explain that & if you Know about points you believe you Know about intermediate points - check When have list, have all needed Scientists would go diff True of Suell exaliles

Kepler - Clewith of throng and fore

Science tendency supplicity Kates of as function puffy much linear

There is no rule how to do this that seri does, creme does not (no constant) To law : more economically waterial with one muruler. So some suiple property of light and is to find these properties.

This may be interesting to student
of English & History
and how fully do you want whole course this Kiali ! this particularly good case - But I would do wherever it is a good case In weather you do not find law weeks had information in refraction but not clever enough to find law_

Rossi - A list of our examples principles and a list of examples hach on black board - wases marters: good results with & class - Teacher Should with understand.

2 not very difficult - With these prosepacus
we'll reach large group of teachers

Rabi: Newtonian explanat that hight
if attracted and goes faster. But there refused - Found regularity, then the challenge is to find the model-Marters Jathus between vary of light and the line we draw on paper
Rab Lee displacement. So we see that I do not know how much in course But I we have such a beautiful opportunity I should take all needed time; do from all augles-Looning tu alwast all cases ni which child explore new field, nomenclature of defenit is very ni portant ui portaut

Rali If right class, half way I wight luri classroom in lab.

It was not brigging to compose lecture; but just leading principles

2 Would you let stud as to wrong places and their show mustake

Ral: Don't know. - May be infroduce confusion ledge proproally Maisfers & Rossi: Phere is a step from service may and
there drawing as Maristers said Friedrice: do you want to tell us all steps:
I Regularities
2 Model show that steps are not
one after other. Sometime as back
and question previous.

Roch: At another want to revious. Rabi- At each opportunities full advantage
3 push of respelanties to generalitation
3 extrapolation (Bell man com be left to Student Tach i Bell flen. If set Rabi it would be better to eliminate effect is complicat of main line to be very careful. Careful ayle once have If student looks ahead development

Rali: teacher can say I am trying to teach Tomething more medie i cheldr at least foreiger like to fake over Rossi : teacher must be aurare i but Teacher weest Revor to ruch as to bruig to higher & higher levels. 2. Useful purpose if you can blintroduce this knied of feaching regardless of time (one or 2 yr course); is Darwin these are techniques - more motivat 2 at some time stude sick & fired. Teacher there changes Freder 3 am worried : 2 ideas : one reuse of ideas 2, semplific, and there backward from suiple to complicate Lo vou 3 is 3 Extension 4 Extrapolat 2 2 other acts of fauth any experiment he would do does not He does not have Twe Juffre precision

apparat act of fourth is precision possible hiedre i Dre 1. Meth of science includes also crude docta - also vi felu com front of his eyes - How moving Rabi precision not unport at this stage. Friedin : occasionally we come thow they cannot do francischoes, but we thow Lach: here feel strongly - You are dead worse in emphasis precis: It is a mean to game should ideas. We and looking precis ideas mather than data.

2 - haws are exactly night: conservation Rossi. You cannot get it completely
2. Students who want precision must
be allowed to fix it the way they want to
Rach privatele
Rali to teacher can do it, those value
of plot of plot

Ellusis Lu film you can que presision date Rabi: auther pourt, with very suite means in refract get good weelts of dato. Falling bodies require complicated apparatus Discussions on dada, mouries, babulation Rabi: I am worried about Afroboscope - Galileo not have, I would not want to introduce Let's get deas out with surplest possible means -Rossi - Mushadious Friedin greater do not go to ideals, but go as close as presible. Historically had Rossi: was rather utuillor than experient 2: infution offen wrong make point that nitereuses are reliable Rabi : story of musice of sacret method formis : every of parteenty to do point out that law good only within lungs

Loonis 2. Rain home that everything is model. How four from reality? Rossi Lucitation of seese of reality on Looner - Examples of universe woodel how thoroughly anineportant you are But all we know about this is throw ourselves - Religiois reasons. not Frank. Models, what they learn is Rali referact beautif case ! thow all ofher

Fr if students argue will be really interested

of his physics Bethe: scared by trousitory models:
we do not emphasize solidity of
physics fuie: model has limit. This is a canderi, but not give idea that we do not know what we are doing. Touch. Fredu reodel to Rabi ruodel to explain some facts

wodel you question reality axle. Asscrission of the "Proi" Hory. Brandwine Freedom of physicist to discover Some there there new is prurlinge of college but ui high tchool we go down live 2. How does steedent knever it is a model have used group of leachers, as if they were Tach

12 yr or 1

2 approaches 3 physics

2 2 approaches 3 physics 3 Points of agreement a) Juclusion) (what? b) exclusion of on what grounds 4 Irly to be done a) What b) Who c) When We need to beser more discussion in Cornell group to decaricaturate their

Complexated by fact that Cornell is 2 yrs MITI that Cornell - Teacher ought to be allowed to go on where he can brill enthuseasin. 2) Other thungs that can be uncluded, one or two right to Lach you want priority lest There are some musts Bethe - tot know h Conscolerable auphorsis must be made in developing scientific method Difference: emphases & exclusiveness Should not be the only objective I the I we heard most about What is our outline too full. not is as full as present curreculium, but still too To accomo date developm of Scrent Phought must sacrifice Some matter Juste working of law objective

Best demonstrached by lower as for helit & matter Many for the not only I subject in plus. For I wi depth ophics is very good But plea for many subjects not occas but not ne all Coverage Lueston, whether subject matter is covered It be covered to me unfami subjects have to post be covered. Incomplete

so product be at end mang be

so post We cannot do pushice a course without what are Thould squeered out. aforus seems un portant Our group: plea for hichesive course of chem & pluy - See arguments againg laster lyr - vivolves > people-

Still like our view -Rossi. Which chew essent for atoms? Bethe Other way around few Important for ust Periodic Rossi i if we do not succeed in zyr what chemisty 2. teachers west learn both Rossi: 2 yrs: first lot phys and lettle chings 2 A question of dactics. Then we right What Audents will enter courses? What is 9th grade squeral science? about the whole secondary study
of towice
Thurst of phys discussed ought
do come first brit in general
Churistry comes first. I

title chewstry swipler and more
by rote

World War 1 - more physics thouse three chemistry three chemistry was sold chemical won)

Mas sold chemical won

Bethe writes: many vidependent arguments for I law or Solidity

Deduction of phenomena from laws

Mathematis Mathematis. maisters: course ought to be a widefend but integrated only & would have the for 2. Lach What have to do better than this 2 Real situat is curriculium; have requirements 2 N.J. only 4 fors gym is requirement There is no fune for everything if there Bethe: Some arguments for coverage, some for coverage, some for coverage, some for coverage, some for appropriate things in a much allows a much of phenomena to be diducted (muit ferseion) extension) Rossi at some place emphasives cause & effect, dynamical. So mechanics

Bette Porit not much said, in connect with Whaling: emphases on technology But inclusion of math & developm of mathematical wear So this is the reason for present fine physics rather 4 ys of math and no science than vice versa Friedman Considerable affempt to show how much we can do without matter Friedri not Murch of that either Bethe change ni physics: explain new model viclude old. Do not advocate to take outline prepared Cooper Model may be new ni small area Friedman i we agree Rabi on 192 (245 vs.1, chement & pluss 2 approaches) Chemistry can be studied with very

phys requires lettle chem at higher levels the 2 are unified. To this out to weify them one distorts ani changes standpoint that may be dynam and chemic retactions & Per table. So afraid little gamed, much lost if mify here auphain We got to get atoms. How to do ni way that would be solid, not a series of things. not much logical connection appearatus but not adones Experience of course that died although started with great enthusiasin Les Democritics afons much aspelwent; disappelment on weight and teaching techniques Lach thuik many things we thould by to leach full body & flavor, at least best earry away well the this list only thurs of which we have good nuder standing of : Couloub law, Lovenzet force On other hand there are many devices, ideas subjects not good understrandence flow of current electr (o hu law)

We'use Ohm's law, admit how much we do not know. Use human eye, do not underst physiol of obscore In chemistry there is more deins in 2 category: wet chemistry is mysterious dipole forces, wear electrolytes, strong elect More of this in chemis thou we need to find in physics. Molecule complicated if 3 atom. familiair with # the, but man Cornell chemist. Many cheursts feel like me. Those consulted do not leach 1 yr of churchy the fact in 11 yer parcels by rote, routine material not understood. Reflected in physicists. We want to change -Importante of stressing reconsider -Rabi questions outline I atous, moleculestructure. I I parkile mechanics you change reference; course episodicis, I does not prepare student for The Man Com Bauer 3 correepts to sell in chem 1) matter how structure

differences of matter due to structure this is what affeurpted in 11 2 there are reactions; can change Structure: hours covering react notion of dynamic equal hossilcheunst: let me finish - we need plug to Bandrex pl dyn equil which very un portant. Raly witerrupts. Cheu Bauer 3 rates of reaction Present studes he sale have no ideas of these factors. Missed ni present curriculum. Rali Why carried conditive give it without combring with physics was many models derived from plays, like femperature femperature Cornell Chemist Band Ponit 2: working in vacuum if we pretend that structure of matter does not influence property. Surplest example vapour pressure Measurement & plot of press against lemper

man on floor: We study world around Fredinan tot thereistry pictures Eustion of how far you can ens
perhaps historically not too good Bethe functor from I to I ist your are right but VI is tructure of watter, where chem & phys come together Rali chemical inferest comes unto reproduous, Structure of watter only for understanding. achieven of chemistry is to have gone so far by the use of notions that were so hard so understand, only now become barely understandable By and large underlying reasoning developed to later, was not motivat to go ahead. at this level they are different distrible

at this point you are not guring to chemical point to rein of chemist. The stud will not have the chemist busporie point of view

Chemistry developed urthout He better use notions developed for chemical purposes, and that are not understood by physics -The Krid of physics we want to give Organic chemistry should come after plays It is hard to devoice it from plus This can contribute mornously to teaching of chem; not vice verson Teachering of cheer changed in 20 or 30 yrs- you (Rali) not speaking as modern Teach High tch Beneficial to go ento chemistry from physics. Studs did betber in both if physic first. Rids take to separate subject argument sounds like 1890 where Loology of botany were separate. Tuevitably the 2 come together it Es biology. This is evolution of a course Competition for twie - hufortunately us word hig sch seeme teacher for most scrence - cherre to plys by same man

Cornell outline los defficult. But entering - much thought - Spenal system: we start atom asked their What disciplines goes needed " Man with paralysed hand audien (2) Physics first. Physics has so much to offer do chem Mechan electr, wave, atoms first after this churchy deeper foundat Goldwasser: We should say frist things first Physics first with some exceptions Lach. Swell law used accidentally not best example of a principle --Deferences of gases teories & Ohm's law Polland arquient for chew first. in phys you need much more month done well

We must save that the student Knows about 1 adoms & molicules 2 gases & liquids 3 violecules move aver. KE prop to T in Heeds 4 there is a distribution Vapor pressure this must preced the point of Vapor pressure as example esas can condenze to form liquids relation between a liquid & gas (rustecules que +aure Temperature) experiment must be careful ni designing Vap press as funct of Teur subst vap press Tabulated

plot is strange Usual quest
about points in between etc b vap press Tabulated What about other logueds? There is a differ nurleagle

Search for proper function fuid logarith get Straight line in Smill epise is easy, here not Something lost if too easy various straight lives for various substs trocus of lig from gas & gas from lig are fame type More concerned with 3 & 4. Why does Cow works? What are properties Why molecules condense to form liquids nature of nuclic, whether symmetric or not distrib of speeds: which wols will escape? fast How many are there Real gain by falking about forces between molecules - atoms at same suce, rather than a yr or eyrs later Rali. This first you want to treat vap press here at this level. Bauer given perfect lesson. But question of selection of topics-Frank: plession: do we really give an understanding that stug h sch can really get is different way thou throng Hatement

Friedu If you do this Hus at Columbra and yr graduate. Rali milmon, at Bells to graduate engueer axle how unportant vap press is to change? to he really wants to feach it, we could put upo our course. tuurediate uitergration does not do Glichter - agree with Bauer; but difficulties It is the brinden of chemist to talk about Structure, but plus Should do it also Perhaps macroscopic . If we take this wan opportunity of something new, then witegrate suggest meritorious considerations in Bell Lab Primarily a phys course renforced by chem But I would like personally more chemistry - Two curricula 2 .. . 2 yr with Cornell outline Friedman Possibility: blending - Does not need to be uniform blending. We do not have to decide proportion at each step agree: 1st year heavy ni phys and

When we actually work out we shall find out how to do Bethe Howe blend, blue flex obility will exist If we separate: was unpressed by rewark that physics requires much more mathematical sophistication If phys first, chew last, phys well lose. If present math curriculum, phys better in section - So Phy in 12 yr. tu our group Cornell, 2 chemists knowing what they want Would gave in presentation If we talk as separate course Structure of matter must be repeated you talk as student is tabula rasa Unealistic - Suggesting that you may be obliged to fuid out how much he knows I or 2 yes of general science Stress on concept of function. Could be he general science - Pilot has a return that child be done graph of run of u formation Major problem is to take what they have a extent

Would make sense to think of mater as not only teaching but focal point of use of ideas - aurea may be understanding structure of matter This would in agreement of cornell If we agreed that would be and focus. Their subjects would be treated as in reference do farest area. Rossi 3 focal pouts skrict miversal gravitation hed together hight (measure this elusive) Frank if farget about you leave them with idea so much to learn Rossi I closed I open subject

Mulman make clear bearly stanted to

understand matter They will see very

little of

Mousiers - The more I think about process going on here more I think we'lle come out with something useful if we thick important role of monograph Want world picture levery out writes a soul- But also method, culture job

of teacher could have picture in dramatic way, their job is to put spot light on some areas or in all if there is fine Teasher says are you visterested withing how is a wonograph -We night not to abandon either extremes. Ralif Lurvey and then let room for variation. Students vary. Some must be fed with wofors applications Some waves etc. Ust all for everybody. The Cornell The Rabi with class room Loonis: We have to drive fairly fast on what each group thould do This steam of thilings on blackboard is one attempt. A flew afternatives Write different concept. 3 parts or wholes of phy Mechanics substantial convent but + Rabi these only 2 choises to start thered leading up to aloms

Another approach is Cornell's -that difficult although historical -Would use ruch & light as brutaling blocks. MIT could take light and make a course another group the others Bethe most happy to hear Frank: first good word for Cornell. Tu thorough way only in way we did the we wally focus on abour 2 yr course If leading to atoms - their Rossi outline Order of material needed for assignment Could one focus attention begin by Rossi guring afruic approach without dynamic: seri Chemic idia. Does not require augthing Then light and huch and bring in all we can about atoms. There electron Not clear how much atom at begin muig? Bethe Part 2 Rossi in part a you assume maquetic

Ross how much with less than you morris to begui week, it was mi port in 18 th century. There is no other way but May be to in some year with satellete interest go back to mech willman This closer to Bhal syllabres. no obvious advantage for the understanding of puchamics to have light first Fredinan- you can give enough dynamical
feeling (pushes, shoves) without force in
light So you can do Kinemat
Rali outline that may combrue then say qualifortive real about weather Rossi how whe Rali tell it is small, without escaplaining Then there are different atoms chemical and phys colors conditions, liquids Differences Chardness, melling point Thu talk these atoms differ because structure differs Parve exist of afons

by some of these differences External effects: most un portant light: Turide atoms only by effects This is provoking curio sity - molniding possible experimental proofs fat since Rah Know not what method for thouring -surie etc. Rossi agrees
Morrison it is just the withinstwelly want
What we objected was from here to go
to mechan If you go to light very
well hoes good motwation Rabi affiliale of Jeacher in Snell then it this is both mahore of atom 2 wave Looning Requires cleverness after light old shower if you give dischaurics Rabi start nich by saying infernal norning parts - Cannot discribe without nech. Loonies assegnement jes de ui defendent of Knowledge of method Bethe - Disagree

axle: viconceivable for group to accept pices without revision Tob of revision realigable with that of puttering wechanics wito paper Storue mechanici avoided by postponement First very one want semi-quantifative Rossi i when I do mass in mech I would like to say is due approximately neutrons + Cooper mechanics later because nost difficult mathemospically Freduciae Despite diversions Schlichter - Be glad to have a crack of this Last of udraductory

Cooper will do no backing

Latous 2 light 3 mech ni cheding Coulomb & Rorenty How much criticson for leaving out

Loonis Introduct State focus Say Agh. Sure can pay for monograp.

Rali adds a no 3 macroscopic

Drut Kupu what heat? currents?

Mustic theory between 2 + 3?

Friedu Hairing atoms Kinitic theory as 2 apons woven hi - so lot us formation all through course Floor Consequence of approach always alones in wind rather than bodies. Friedman Pach group 2 sections and over lapping. So fellows who do atoms
thould see who how go with light
Floor gropp 17 2 11 243 Rossi - before writing very detailed outline Discussion: Johnase, paragraph - possibility

Marters. In lower crades done before Teacher often have left hand ideas ideas teacher student activity that kids can Suggest thes Alexan Osborne - take u muid laboratory have thought of experiments of on atoms. Expense would wifluence in selection of experiments. This would wifluence fext. Tach: in term of apparatus we were modest John - Doubt if 30 the possible. Ost in making exp used cathode tub offen How expensione? But their arrived Morrison: want O section - Counting & measurement. Want? or want Rabi; after you bry some quaretifative section Rolli i treamingful at begginne

morrison : number. can you count for beyond Lack measurement qualitative, symmetry, Rali psychologically wrong at beginning.
Rossi: why not call farget area universe rather than atoms, then give feeling of sires

then is universe and other things

Bell does not want any more axle. Bell can do what plan morrison would go on with sure Rali actually you thay on atoms. Rossi give idia of what is number of Cooper on 4. Quantitative aton. What Rossi Bethe on Bohr atom & planetary not decide 2 or 3 groups should take 4 Bethe lu what seuse do we take 4? to give ideas not furfable for writing

but may do 15 page outline. Audien : let us brieder us only for 15 page outline Tach: plus: you'll try get people to write must be good high sch teacher. When put down ideas, keep in much other? Columnis No law aganist taking from specially good book. Bohr-Ras written some clear thurs Where Where Chlichter: ui making outline midiridual puts this slaut, must not be under pressure to dictate Rossi Thet We have changed ideas, this went of coming to gether Tack back to assignements Phil warrows and univers Bethe Cornell does 1 and 4 MIT 2 and 3 Cooper I wave particle duality Bell hat mechanical waves Osborne & Caldwell 4

Suggestionis & discussion of 5 Loomis Lustion to Bethe Kuntic theory Would write disregarding fact that light has torque Bethe Process of scientif reasoning in troubused showing theyou write nech without Lach : Kids want to Know same questions again again. you can paint there over on another topic 2 People learn slowly Whalug! Tustruction: Cal Tech we can write monographs. Exist in Fernican's lectures. If they are above ofter soudeuts' heads. We would like technological mono graphs -Ferman has notes. Will fry to write there out Tack kecheologreal three will be 2 Sect 5 can be all mono græph? Morris: 2 or 3 diverse & thort monogr presented as 5maisters - Cornell outline would be better as resource book

Cornell book on the type of HG Wells. Chemistry question again Rabi do not forget that other parts historical parts lisk some science historians Tack monographs & people. reconnectedations Lest neverson i let of Screntific auericain Rali Overall editor - Staff. Tach Bert Little at this fine. Loomis get thedeuts back withis prefere We would like at early stage to by on Hudeuts. We would leke to Hart next september - We would have lasy support from education This elevent should be brought ai Marsher don't forget teacher_ Ly Tach. Try to get this feacher right now. Los asle we would like suggestions. 2 When you west with suttine bring in feachers of physics. Those who will teach Lozinis I bujung, I bruig many in commelle

Tach! not hard here Cal Tech 2 courses
1 elucidatura a book as a course for
2 atoris & riblecules
Cornell, would you like to do tomething header
hi this line Saluer Thuron How ask him start woright away How thought along at these luies. There as on to feaching. Lash Rabiis it possible find somebody at Columbia to work at with maisters? maisfers: would like I man arle: we want man to come after class, then tell us what hap morrison a center set up at physical society. Thach with bar? Morrison. Beginning of a permanent Haff. Osborne: Inclusion of Special relativity with flust algebra. Done with freshmen Talk back - hustern huderstand something So osborne does it liste: need not say now, but may want a 1 or 12 day meeting in ny

Tunday the day after Meeting 30-31 Jan 1-2 feb . West re 3 if we want to meet. axle of White felin If Franchors a film we all want to see tach : be can easily fund a room -Looners : may be in hotel Chaucey: Tryung material premature.
When ruthene come ni people must agree is it Then small group with psychol felin etc. and look at different ways of accomplish outle Then wife up and try with your students Tach larget drate for outlines physical Society meeting Should we meet after lunch?

2 Drepanizations of superintendents,

of principals etc

Should be in volved in mi plementation

Track Point is when? Rolli : at very next meeting of this group.
To they have feeling they will be in
the process.

hach barget is ni 18 mo Perhaps not able Rali they must be ni process Lach OK Perhaps a meeting for that purpose but not one of our meeting with thrusture