THERA

ep at $\sqrt{s} \sim 1$ TeV

- layout
- deep inelastic scattering, HERA
- high parton densities, low x ; eA - nuclei
- heavy flavour (c, b, s) ; real $\gamma \cdot p$
- high $Q^2 \gtrsim 1.000.000$ GeV^2, BSM ; $\vec{e}\vec{p}$
- the machine + detector.
- Σ

www.ifh.de/thera

M. Klein (Zeuthen, DESY) for the THERA study group.

DESY seminar, 16.1.2001

Conclusion of TESLA * HERA p

- little studied so far :

  physics potential
  machine aspects (luminosity, cooling)

  was not included in TESLA CDR

- It would be good to have in the TESLA TDR one chapter / appendix on

  " Physics potential of „ep collisions with TESLA - HERA-p "

  $\lesssim$ 50 pages

  1. draft until October 2000
  final draft : spring 2001

- Time scale for realisation

  too early to say

A. Wagner DIS99 ⊙ Zeuthen

- future ep at DIS conferences : 98 - Ade Roeck, 99 - Y. Sirois, 00 - M. Klein.

  [MINOS near
  J. Morfin. $\nu, \bar{\nu}$!

THERA

founded 3000 years ago by Thera in doric period on
mountain Messavouno, 369m high
anciently known as *Kalliste* - most beautiful
today known as Santorini

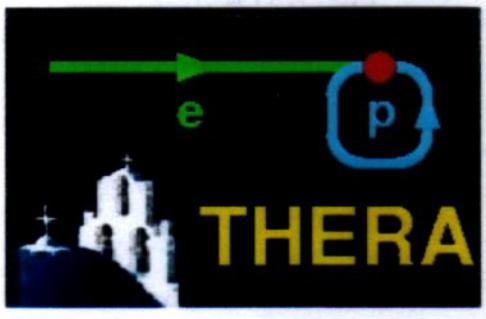
Organizational structure

in 2000

	Working Groups	Convenors
●	**Low x and Diffraction**	P Newman (U Birmingham) E Levin (Tel Aviv) A Levy (Tel Aviv)
●	**Tests of QCD and MC Simulation**	L Lönnblad (U Lund) H Spiesberger (U Mainz) H Jung (U Lund)
●	**Heavy Flavours**	K Daum (Wuppertal) L Gladilin (U Hamburg,Moscow)
●	**Photon Structure**	J Butterworth (UC London) S Söldner-Rembold (CERN/U Freiburg) M Krawczyk (Warsawa)
●	**High Q^2 and BSM**	E Perez (Saclay) , K.Long (IC.) M Kuze (KEK)
●	**Detector and Machine** *)	J Crittenden (U Bonn) U Katz (U Bonn) M Klein (DESY Z) D Pitzl (DESY HH) S Schlenstedt (DESY Z) U Schneekloth (DESY)
●	***eA* Scattering**	M Strikman (Penn State)
●	**Real *Gamma p***	S Sultansoy (Ankara)
●	**Polarization**	E Rondio (Warsawa) A Deshpande (Yale U)

Mail to: Max Klein (max.klein@ifh.de) Stefan Schlenstedt (stefan.schlenstedt@ifh.de)

Last modified: Mon Jan 15 19:06:58 MET 2001
Doris Eckstein



*) contact to
R. Brinkmann
W. Bialowons
P. Wesolowski
F. Willeke.

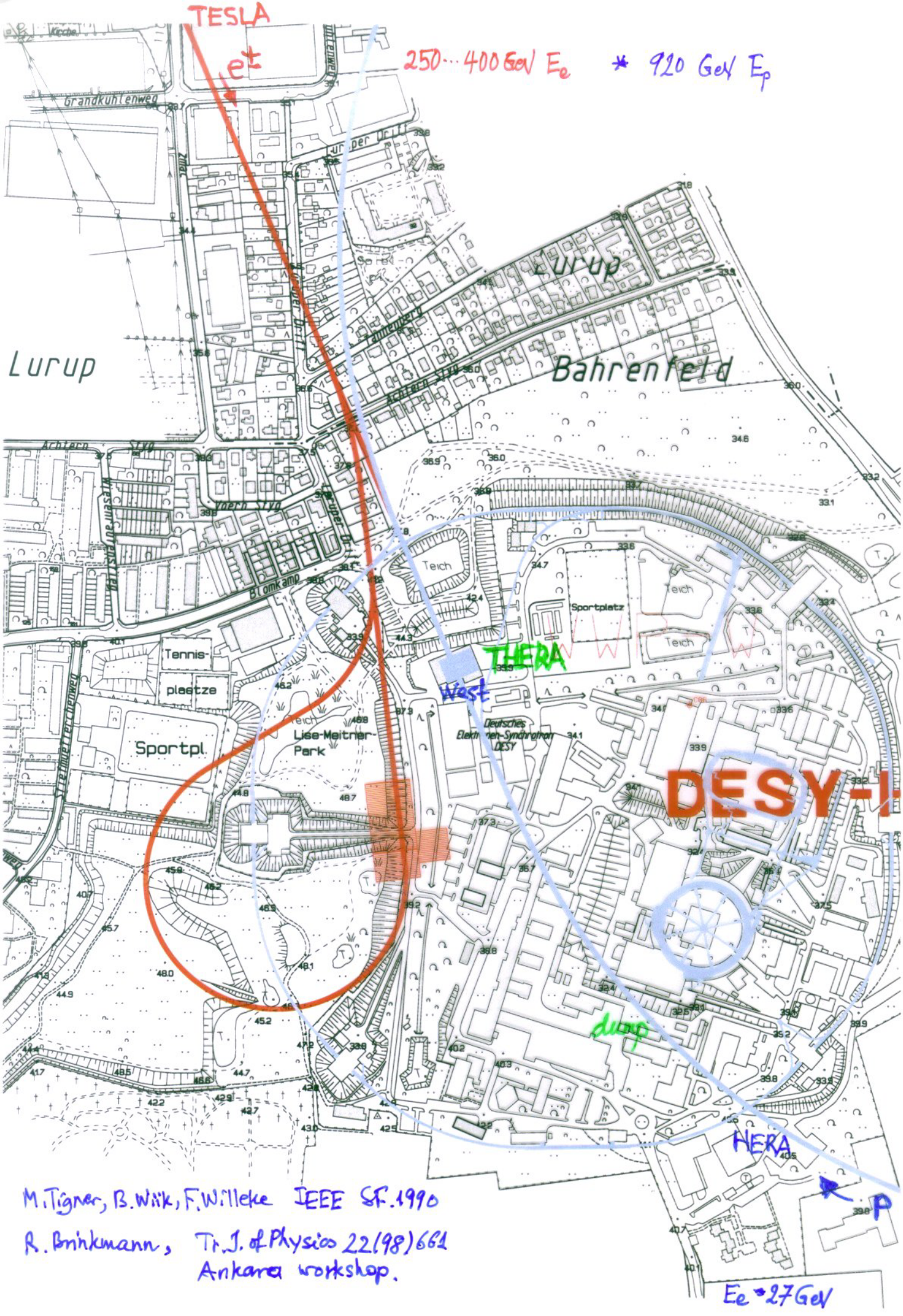
4 meetings at DESY. Feb/April/oct/December.

The THERA Study Group

40

— Institutes —

Ankara University
CEN-Saclay
CERN
Charles University
DESY/Hamburg
DESY/Zeuthen
Forschungszentrum Jülich
Gazi University (Ankara)
Imperial College London
Institute of Experimental Physics (Košice, Slovak Republic)
Institute of Mathematics (Novosibirsk)
ITEP
KEK
LAL-Orsay
Lebedev Physical Institute
Lund University
Max-Planck-Institut
McGill University
Michigan State University
Moscow State University
Paul Scherrer Institute
Pennsylvania State University
Tel Aviv University
University of Oxford
RWTH Aachen
Univ. Autonoma Madrid
University of Birmingham
University of Bologna
University of Bonn
University of Colorado
University of Dortmund
University of Freiburg
University of Hamburg
University of Leiden
University of Liverpool
University of Mainz
University of Warsaw
University of Wuppertal
University of Zürich
Weizmann Institute
Yale University



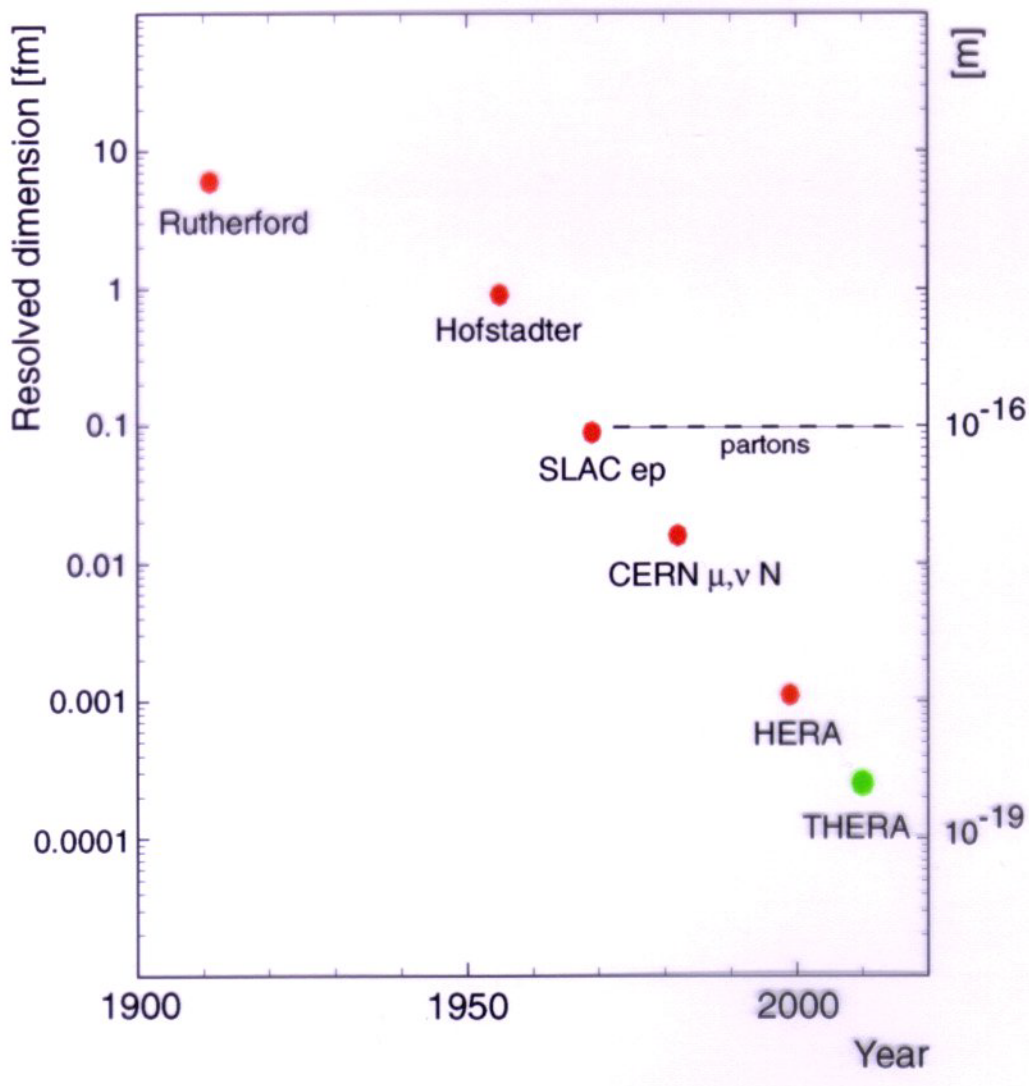
M. Tigner, B. Wiik, F. Willeke IEEE SF. 1990

R. Brinkmann, Tr. J. of Physics 22(98)661
Ankara workshop.

100 years

of particle physics experiments exploring the (sub) structure of matter.

particle	year	experiment	apparatus	accelerator	resolution	theory
e^-	1897	e/m Thomson . Wiechert	mass spectrometer	cathode ray.		droplet, Thomson models. e embedded in + charge
nucleus	1911	Rutherford . Geiger . Marsden	zinc sulfide screen Geiger counter	radium . α	$6 \cdot 10^{-15}$ m	Bohr planetary model Sommerfeld
proton	1919	Rutherford . Cockroft Walton	cloud chamber	$\alpha N \to O p$		Quantum mechanics.
neutron	1932	Chadwick m(n)	ionization chamber	$\alpha B \to N n$		
e^+	1932	Anderson	cloud chamber	cosmic rays		weak interaction (Pauli ν, Fermi $n \to pe\nu$).
neutrino	1953	Cowan, Reines	liquid scintillator & photo multiplier	reactor		Quantum Electro Dynamics
	1953	Hofstadter	Čerenkov counter	linear accelerator 100 - 700 MeV	2 fm	meson cloud thy.
quarks	1969	Friedman, Kendall, Taylor	scint. hodoscope lead-sc. counter, Č	linac 20 GeV	10^{-16} m	Gell-Mann 8 fold way Zweig (61..4) SU3 Glashow
		νN Gargamelle	bubble chamber	synchrotron PS, SPS		Bj. Feynman : QPM
gluons	1980	$eN \to eX$ e^+e^-	MWPC's, counter calorimeter	PETRA, PEP	10^{-17} m	Weinberg, Salam, t'Hooft $SU_2 \times U_1$ QCD.
				LEP		
	1997	$ep \to eX$, HERA. H1, ZEUS	4π electronic exp's $\geq 10^5$ ch's	$ep_{sc.}$ collidor 27×820 GeV^2	10^{-18} m	
?						beyond the std. model.



$d \sqrt{Q^2} = \hbar$.

Wiik/Llewellyn-Smith DESY 77/38 preparation for CHEEP, HERA

Any new facility should give access to a large unexplored kinematical region with sufficient luminosity to investigate what now seem to be the most profound problems in particle physics. With an electron-proton colliding beam facility one can attack questions such as:

- What is the structure of the weak interaction ?
- What mechanism, if any, will damp the rising weak cross section at high energy ?
- Do the intermediate vector bosons - $W^{\pm}$ and Z^{o} - exist ?
- How will the neutral current affect the scattering of charged leptons ?
- Are the weak and electromagnetic interactions different manifestations of a single force ?
- To what extent does the point-like behaviour of hadrons revealed by deep inelastic ν, μ and e experiments persist at higher energies ?
- Do scaling violations have the characteristic features expected if the strong interactions are described by a gauge theory ?
- Are there additional heavy leptons ?
- Are there further hadronic degrees of freedom beyond charm?

most of these questions were answered when HERA was approved. yet :