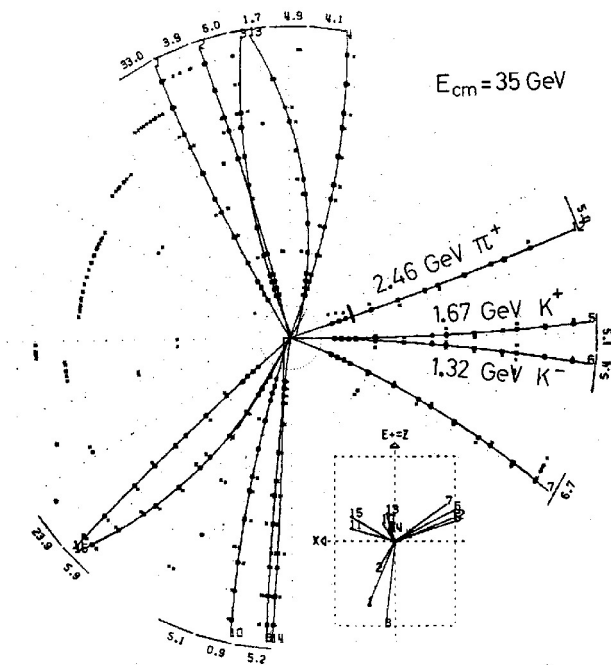


- QCD has a long history at DESY**

**- PETRA**

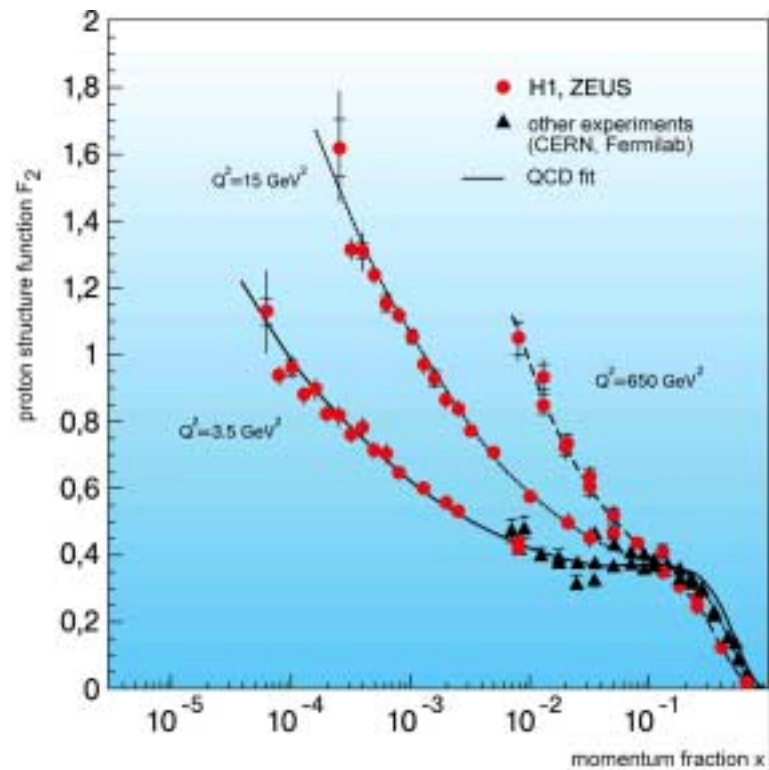


22.9.80

gluon, parton-fragmentation

rise of  $F_2$ , QCD-evolution, -radiation

**- HERA**



diffraction in DIS, structure of photon

- **3 pillars of research at DESY:**

1. Develop and run accelerators (DORIS, PETRA, HERA, TESLA)

2. Research with synchrotron radiation: 2200 users

- 100 % DORIS + parasitic use of PETRA
- study upgrade of DORIS and PETRA → decide end 2002
- FEL with 6 nm → start for users early 2004
- XFEL-facility with 1Å → part of TESLA TDR

3. Particle Physics: 1200 users

- HERA (H1, ZEUS, HERMES and HERA-b)

⇒ **aim HERA II: 1 fb<sup>-1</sup> for H1/ZEUS e<sup>(+/-)</sup> (⇔/⇒) p**

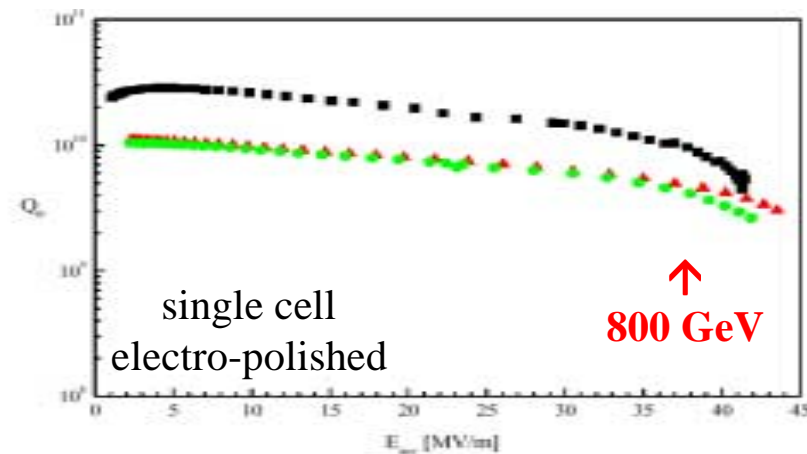
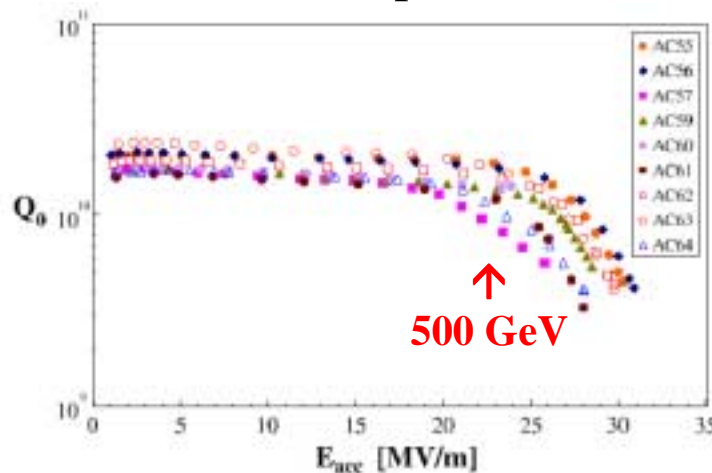
2001: running-in period - 2002→2005(6?): high luminosity

- post HERA II: depends on Linear Collider and physics case(s)

**e (⇔/⇒) +p - e (⇔/⇒) +p(⇔/⇒) - e (⇔/⇒) +A - HERMES - HERA-b**

(input needed from experiments by mid 2002)

- **TESLA  $\equiv$   $e^+ e^-$  linear Collider (500 $\rightarrow$ 800 GeV) + XFEL**
  - HEP-priorities:  $e^+ e^-$ , look in more detail into  $e\gamma$  and  $\gamma\gamma$
  - TDR has been presented 23-24.4.01 • **next:** more accelerator R&D



- ECFA: road map HEP in Europe @ EPS-Budapest
- ICFA: comparison of linear collider technologies  
technical/political realisation Global Accelerator Network
- German Science Council review by mid 2002

**we should have a first idea by mid to end 2002**

- **THERA**

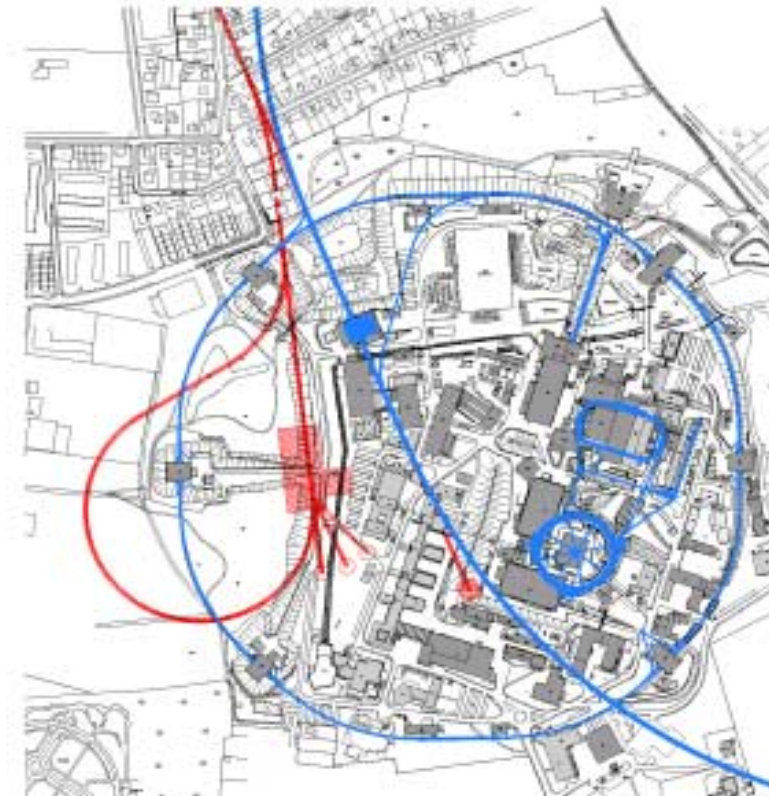
$$E_e = 250 \rightarrow 400 \rightarrow 800 \text{ GeV}$$

$$E_p = 500 \rightarrow 920 \text{ GeV}$$

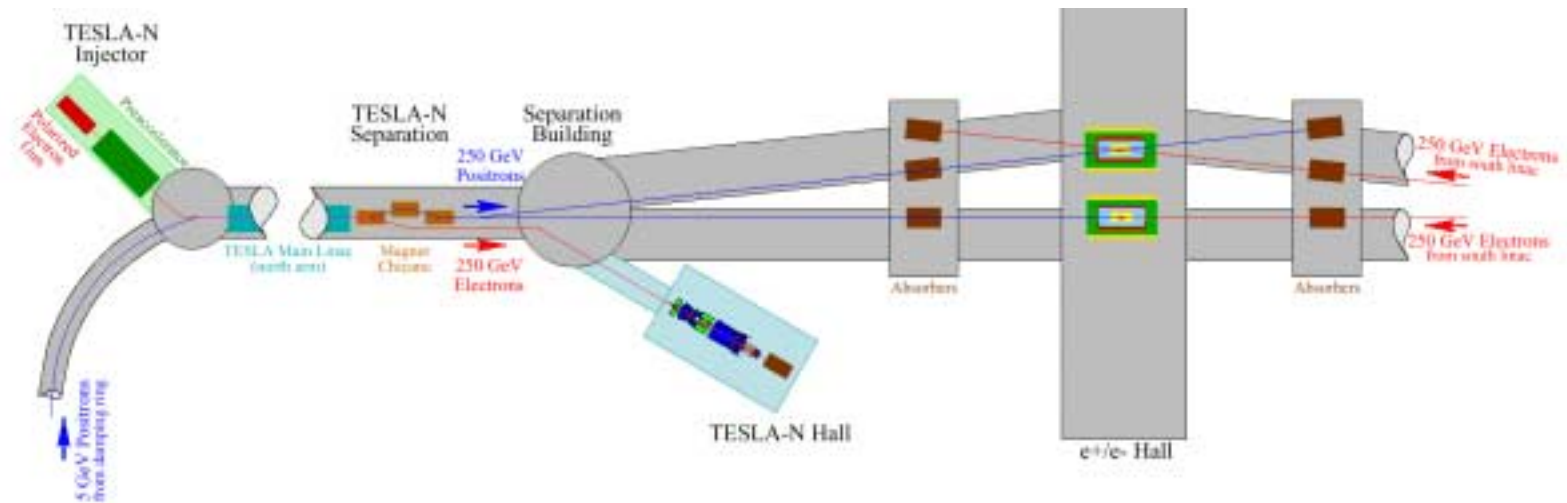
luminosity: few  $10^{30} \text{ cm}^{-2} \text{ s}^{-1}$

?? up to  $25 \times 10^{30}$  ??

- high parton densities in pQCD-regime
- extension diffraction to lower  $\beta$
- QCD evolution/radiation at low  $x$
- heavy flavour production
- $\gamma p$ -possibilities
- if high luminosity also EW and BSM



## • TESLA-N



250/400 GeV e ( $\Rightarrow$ ) fixed target  
 with **low** duty cycle:  
 $6.2 \times 10^6$  pulse/sec  
 at 0.77 nsec distance  
 luminosity up to  $10^{35} \text{ cm}^{-2} \text{ s}^{-1}$

- spin structure in QCD (transversity)
- role of chiral symmetry in QCD)
- exclusive reactions “SPD”s
- gluon distributions at high  $x$

- ELFE@DESY**

$E_e = 20 - 30 \text{ GeV}$   
 polarisation 60 %  
 $\delta E/E = 10^{-3}$   
 duty cycle 100 %  
 $L \approx 10^{35} \text{ cm}^{-2} \text{ s}^{-1}$

exclusive reactions:

