# DESY at Hamburg and Zeuthen


DESY -Hamburg

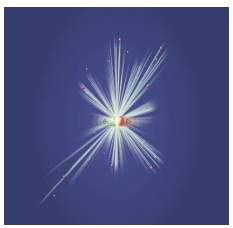
DESY -Zeuthen

# DESY - Overview

Mission:
- Development, construction and running of accelerators
- Exploit the accelerators for particle physics and research with synchrotron-radiation (SR)

Internationally used, nationally funded Research Institute

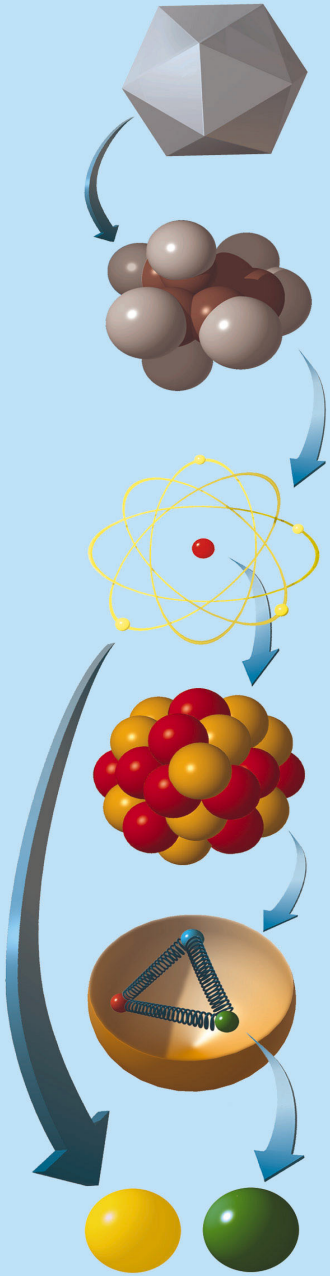
| | |
|---|---|
| Budget: | 165 M€ (2002) |
| Staff: | 1150 in Hamburg and Zeuthen |



Particle Physics at HERA:
1000 scientists (25 countr.)
700 from outside Germany

Research with SR:
2000 scientists (33 countr.)
700 from outside Germany

Accelerator Development:
TESLA
Superconducting $e^+e^-$-collider + X-ray laser laboratory
1134 authors from 304 institutes in 36 countr. contributed to Technical Design Report



≤ 0.01 m
Crystal

1/10,000,000

$10^{-9}$ m
Molecule

1/10

$10^{-10}$ m
Atom

1/10,000

$10^{-14}$ m
Atomic nucleus

1/10

$10^{-15}$ m
Proton

1/1,000

$< 10^{-18}$ m
Electron,
Quark

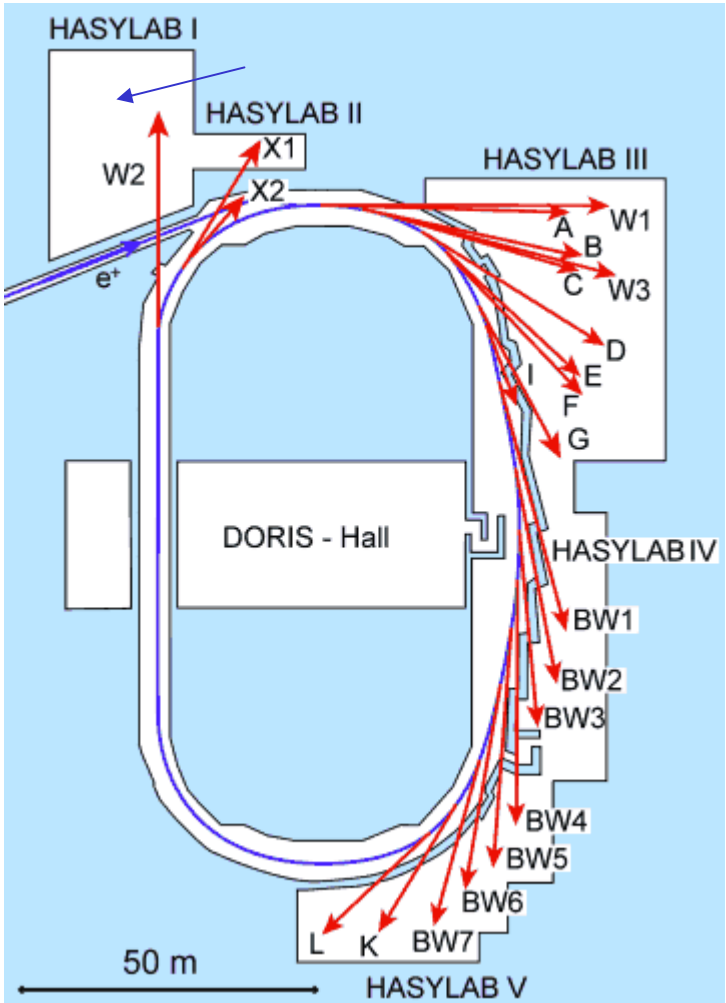
Synchrotron radiation DORIS III/HASYLAB

Particle physics HERA

# DESY - Research

- Study of the structure of matter from macroscopic to atomic scale at DORIS, PETRA and X-FEL
- Structure of elementary particles, forces + origin of mass at (DORIS, PETRA), HERA, and TESLA
- Theory in particle physics + cosmology (including lattice gauge theory + development of specialised computers)
- Origin of cosmic high energy neutrinos (Amanda, IceCube at the South Pole)
- Detector R&D
- Accelerator R&D

# HASYLAB: DESY's Synchrotron-Radiation Laboratory




DORIS:

40 beam lines

80 experimental stations

7 operated by EMBL

1 operated by Max Planck Soc.

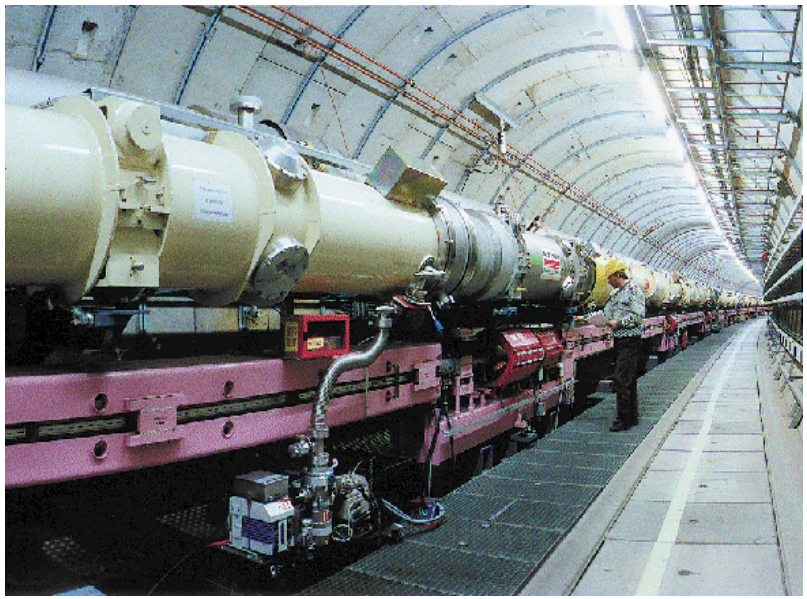
High photon flux, ideal for studying large samples

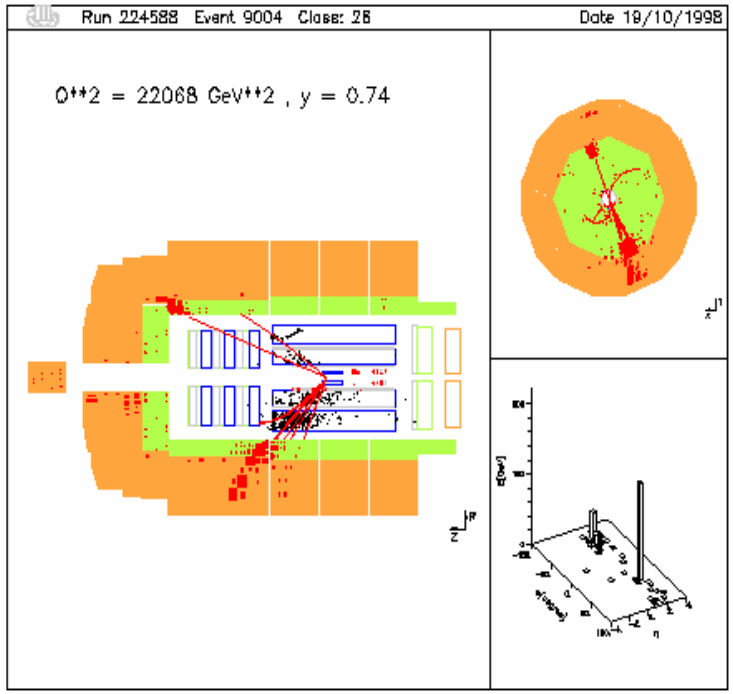
PETRA II:

1 undulator beam, 2 experiments, operation together with HERA

# HERA

HERA: Microscope - unique world-wide - with a resolution of 1/1000 of proton radius ($10^{-18}$ m)





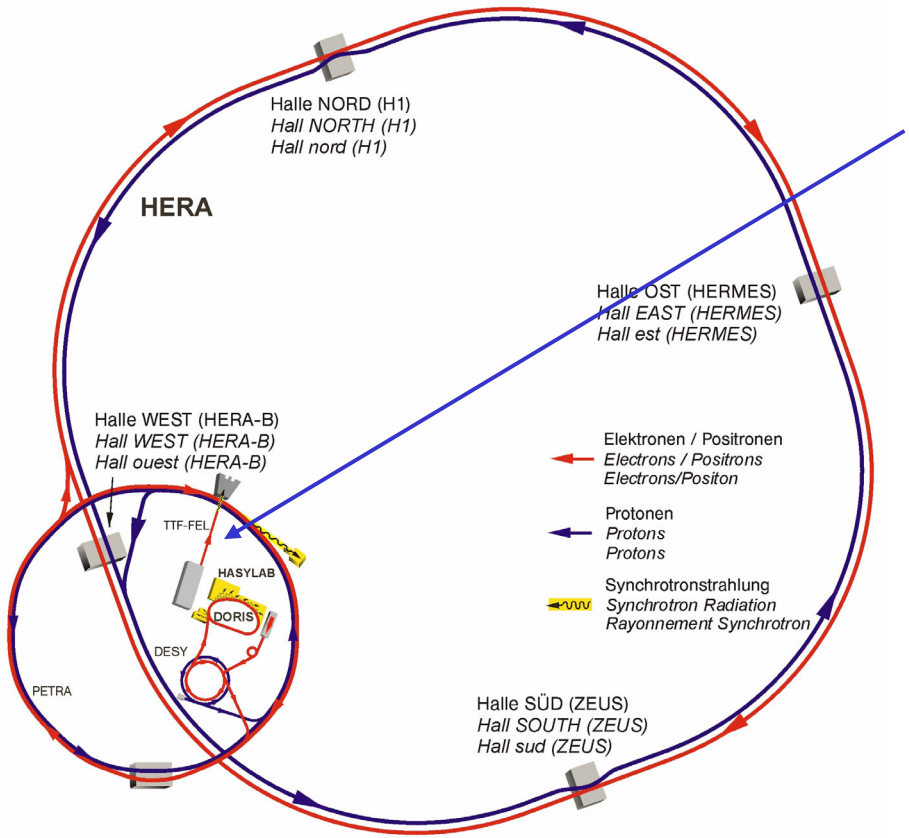

First collisions in 1992

Luminosity upgrade in 2000

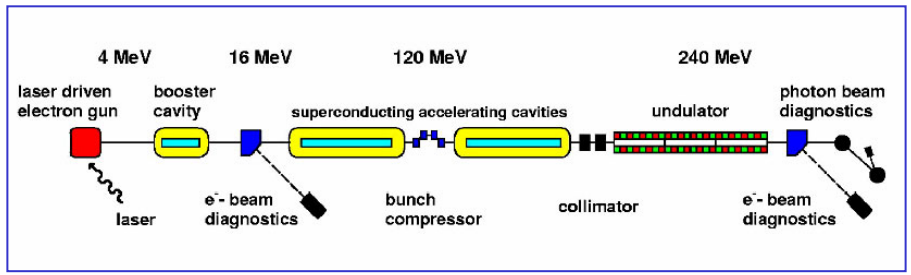
Operation until 2006/7

# DESY's Accelerators - today

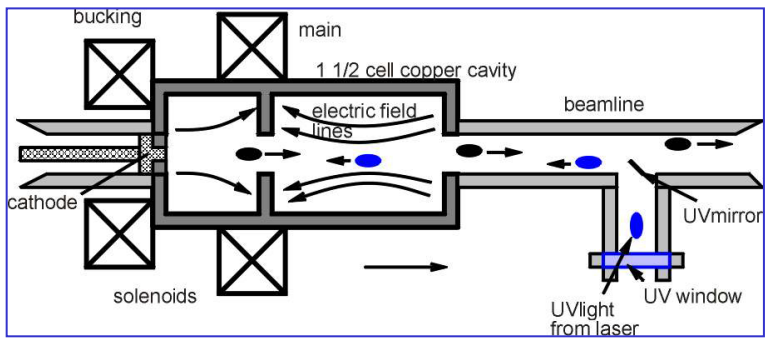
## DESY-DORIS-PETRA-HERA:
## In total 16 km of accelerators




## TTF-Linac:




## Photo-Injector at Zeuthen:



# Government Decision

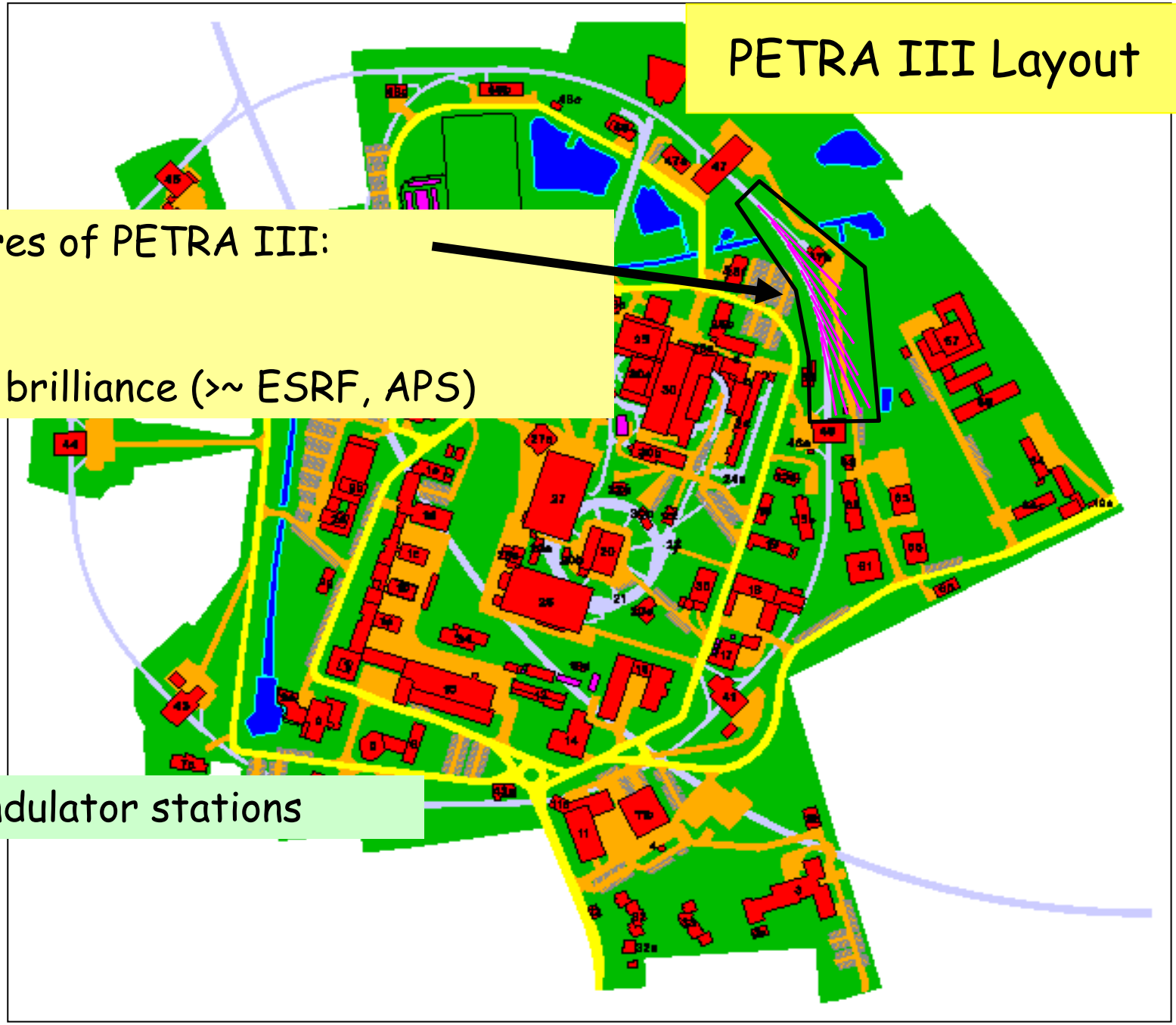
The decisions of the German Ministry for Education and Research concerning TESLA was published on 5 February 2003:

Germany is willing to carry half of the 673 MEuro investment cost for a European XFEL Facility in Hamburg

Today, no German site for the TESLA linear collider is being put forward.

DESY will continue its research work on TESLA in the existing international framework, to facilitate German participation in a future global project

# PETRA III Layout



Features of PETRA III:

- High brilliance (>~ ESRF, APS)
- 13 undulator stations

# VUV-FEL User Facility at TTF II

***TTF 1*** 250 MeV

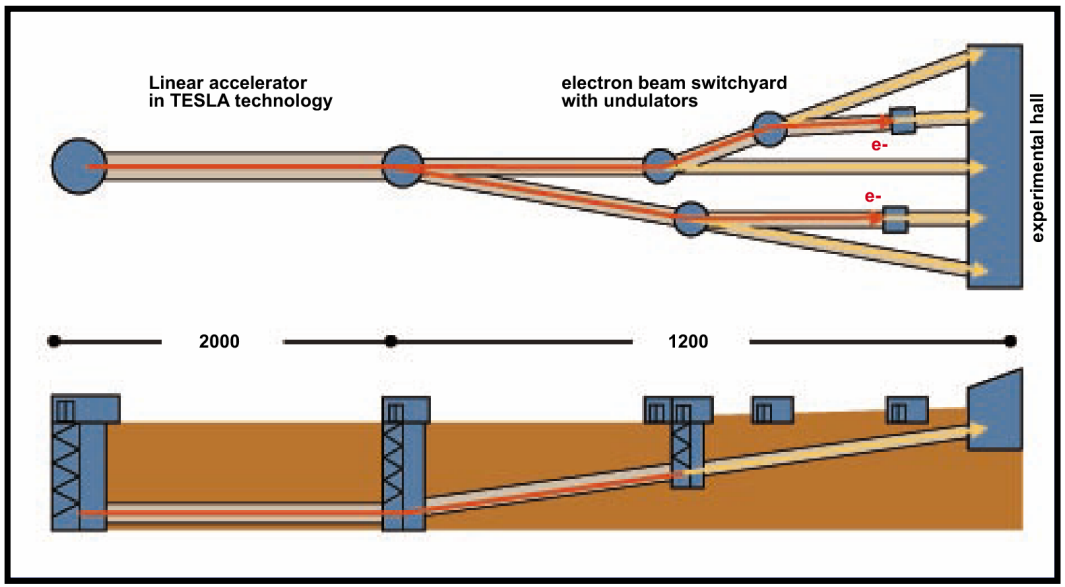
***TTF 2*** 1 GeV

***experimental hall***

Commissioning ongoing

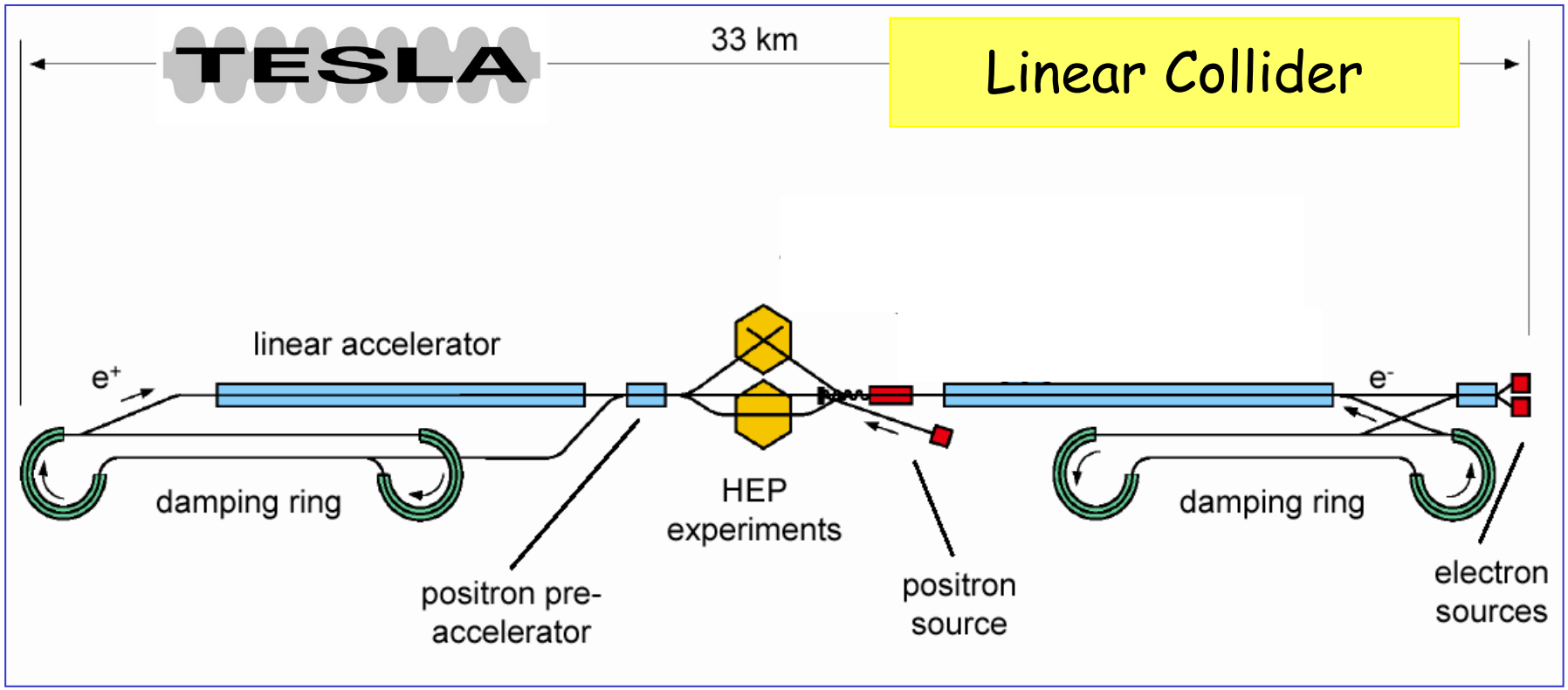
Start as user facility end of 2004

# X-FEL




- European project, 50% of funding from BMBF
- BMBF in contact with other European ministries
- European Strategy Forum on Research Infrastructure

- DESY has established a XFEL project group
- Location and technical specifications are under reconsideration
- Goal: Government decision on construction expected in 2005!
- Start of operation ~2012




A world-wide consensus has formed for a baseline LC project in which *positrons* collide with *electrons* at energies up to 500 GeV, with *luminosity* above $10^{34}$ $cm^{-2}s^{-1}$.

2004 Selection of Collider Technology (warm or cold) and setting up of an international project team with branches in America, Asia and Europe

Continuation of discussion between funding agencies

Further studies of organisation structures

# The Strategic Elements of DESY

The strength of DESY lies in its structure:


Current Projects:

HERA

DORIS

VUV-FEL

Upgrade Project: PETRA SR

European Facility:

TESLA X-FEL

Planned Global Project:

TESLA LC