

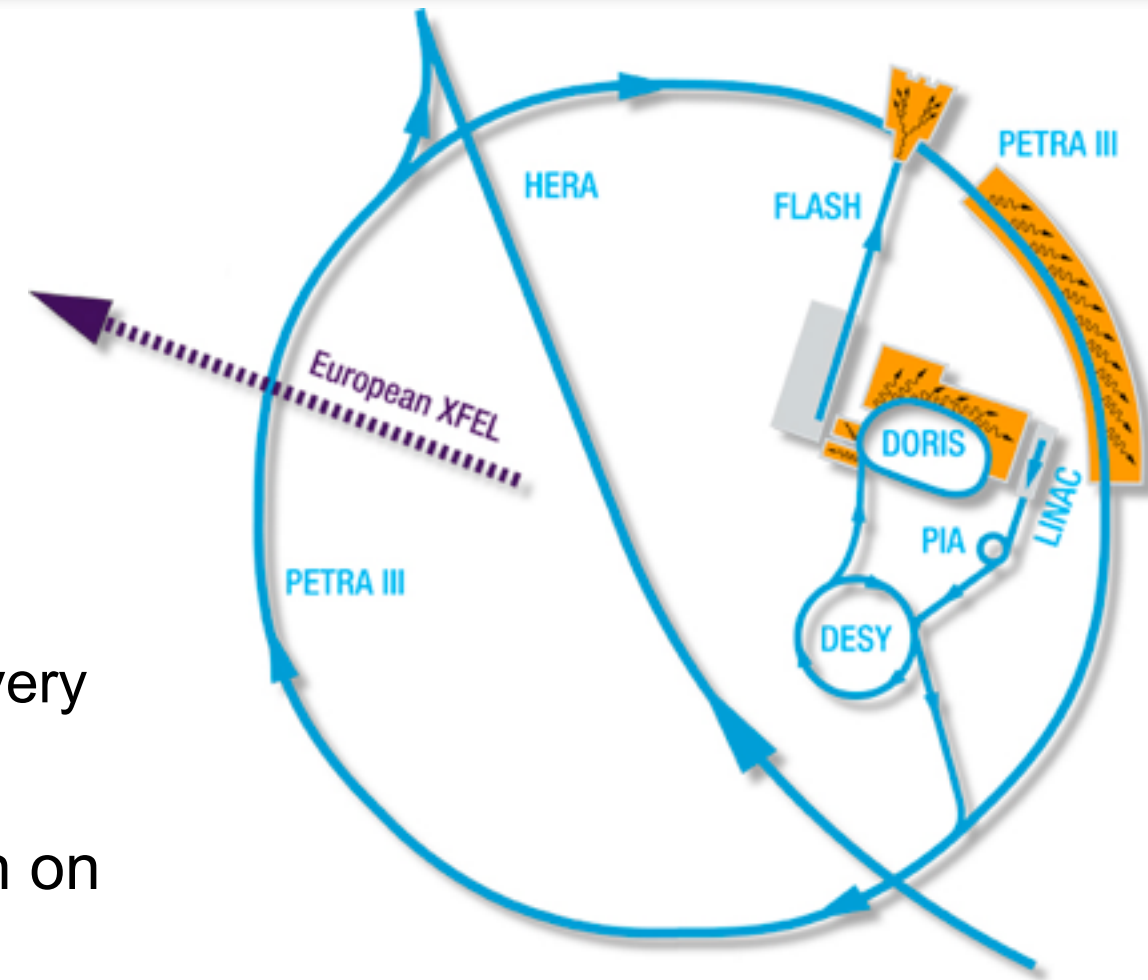
Introduction to the EU Telescope Workshop.

Ingrid-Maria Gregor, DESY



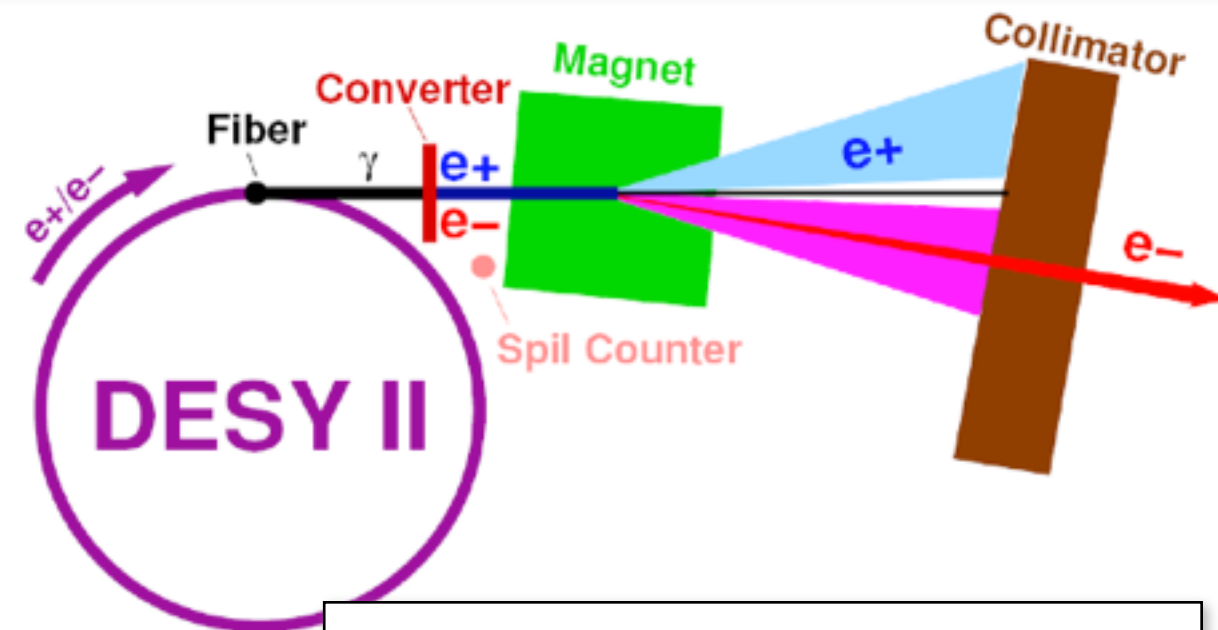
DESY II

- synchrotron for electrons and positrons
- since 1987 used as pre-accelerator for
 - DORIS (until 2012)
 - PETRA
 - HERA (until 2007)
- for PETRA 3
 - single bunches with $1 \cdot 10^9$ positrons at 6.0 GeV every minute (Top-Up mode)
- test beam runs in PETRA 3 mode with extraction on the falling slope
 - extraction at 6 GeV
 - reduced beam current during Top-Up (10%)
- Top-Up mode allows 24/7 running of DESY II
 - test beam usage possible at any time



Test Beam at DESY II

- For test beam no extraction is used
- Inserting a carbon fibre in the circulating electron/positron beam -> Bremsstrahlung.
- Bremsstrahlung photons are converted to electron/positron pairs with a metal plate.
- Beam is spread out into a horizontal fan with a dipole magnet. Collimator cuts out final beam.
- No beam optics, very simple to use

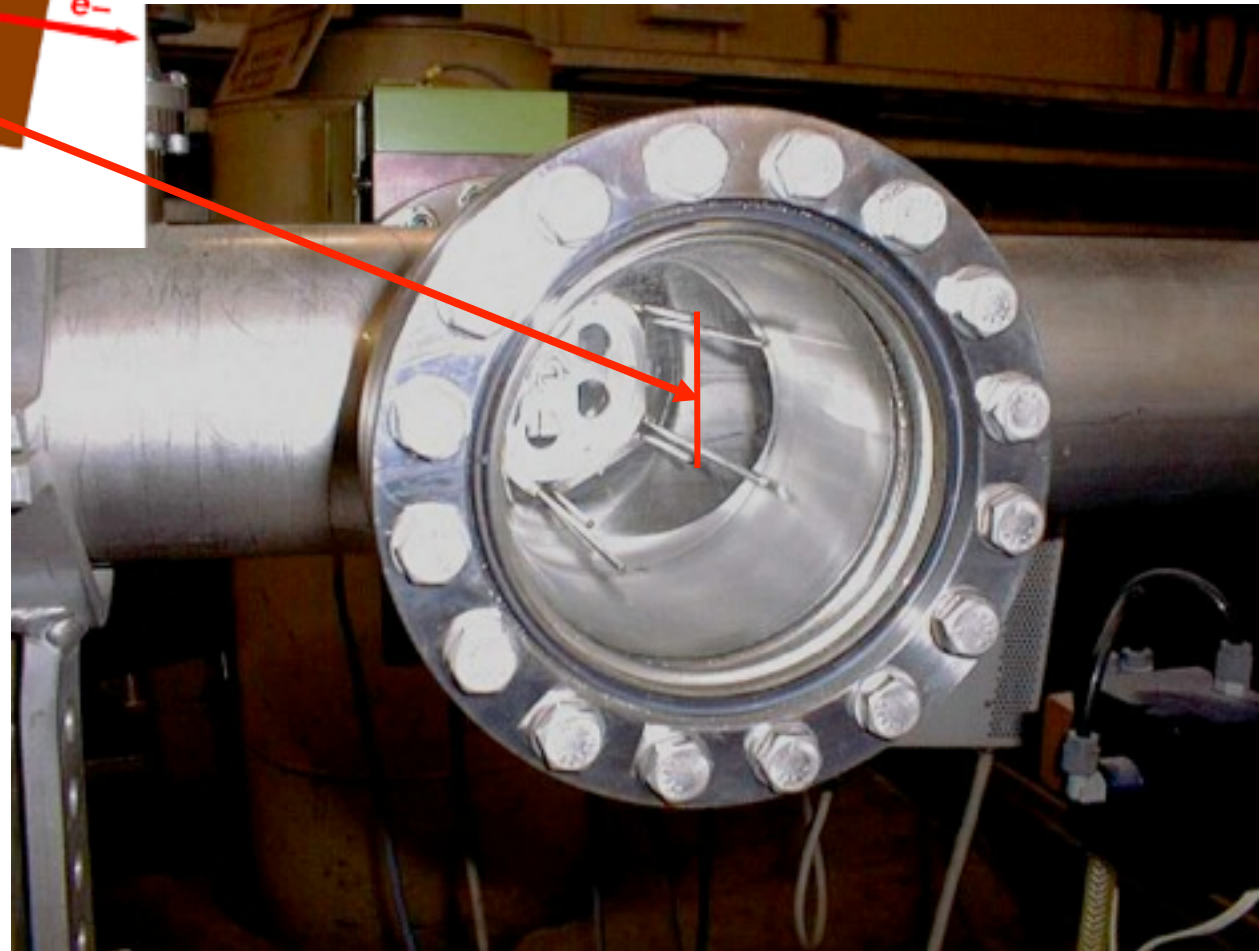
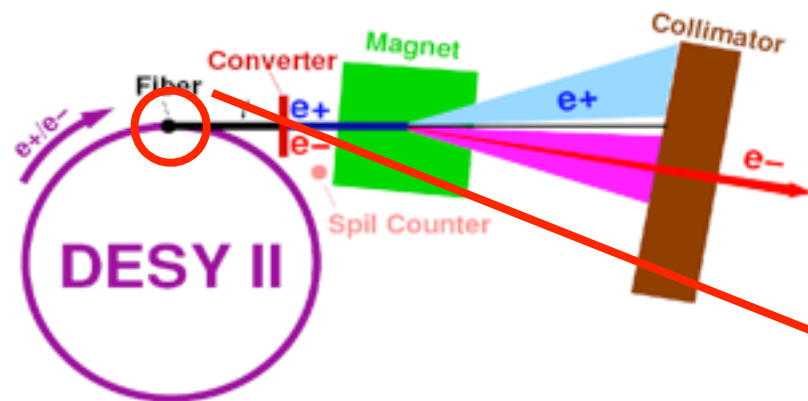


DESY II:

revolution frequency: 1 MHz,
RF frequency: 500 MHz
bunch length: ~30 ps.
average radius: 46.6 m

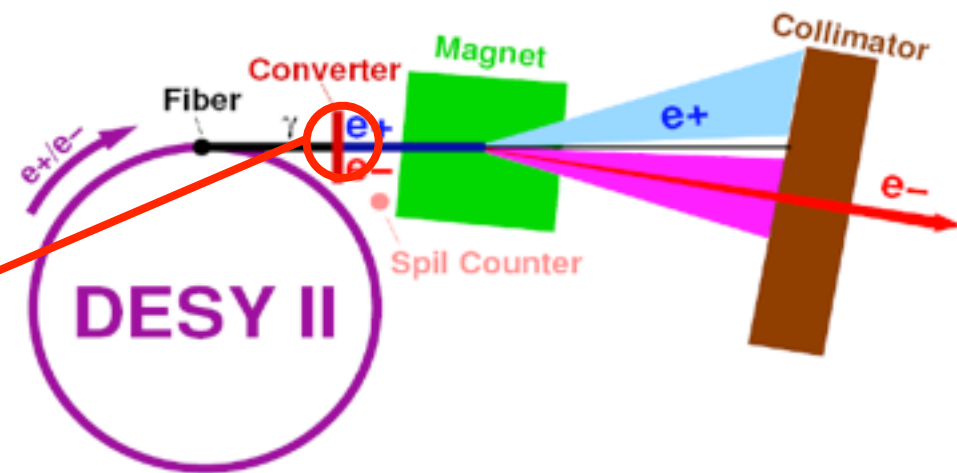
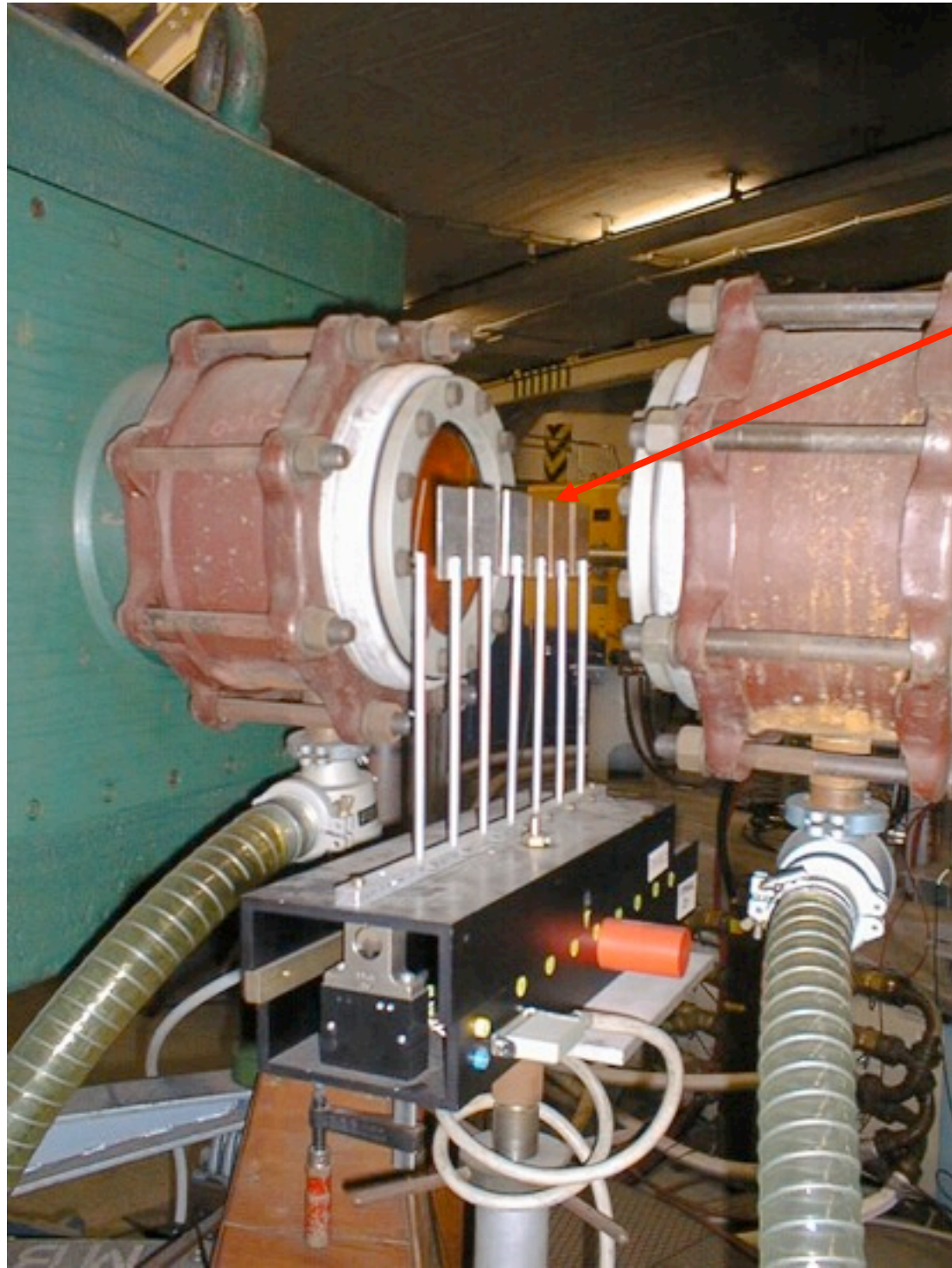
- With this concept DESYII provides three test beam lines with 1-5 GeV/c electrons.
- Test beam was developed during HERA detector preparation and used by all HERA experiments
- Recent years -> newly increase in usage due to LC and HL-LHC detector R&D
- From DESY side: would like to provide useful infrastructure for community

Carbon Fibre (Primary Target)



- The carbon fibre has a thickness of 6-10 μm .
- Six fibres are prepared inside the fibre holder. By rotation of the inner part, a broken fibre can be replaced without opening the machine vacuum.
- Carbon fibre rotation system will be modernized this year.

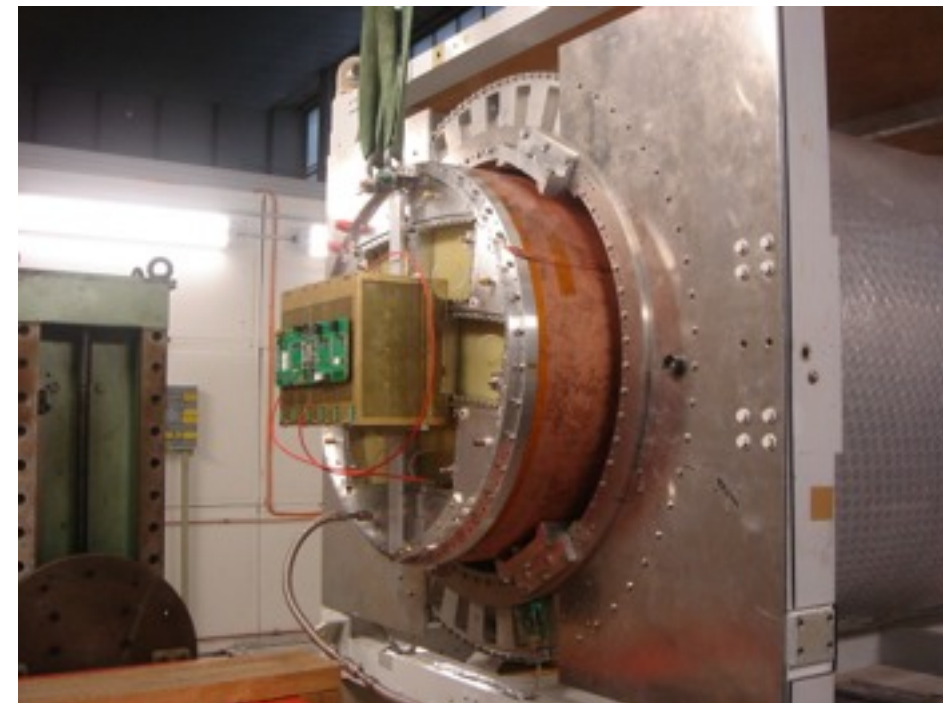
Conversion Target (Secondary Target)



- There are different conversion targets available:
 - Al, Cu,
- The selection of the conversion target is under control of the test beam user.
- System will be modernized ...

Infrastructure

- All three test beam lines have
 - Interlock systems
 - Magnet control to select momentum
 - Patch panels with pre-installed cables (HV, RJ45)
 - Gas warning systems
 - Fast internet connection (DHCP)
 - Trigger scintillators
 - 7 degrees cooling water (soon)
- The users can ask for:
 - Translation stages (four at CERN)
 - Premixed gases
 - Superconducting Magnet (1T)
 - Beam Telescopes
- The users typically bring:
 - Data Acquisition incl. computers
 - Trigger scintillators



What is a beam telescope?

- A tool to define the exact track of a particle in a test beam very precisely.
- Used for detailed studies of newly developed detectors.
- Pointing resolution should be better than the expected intrinsic resolution of the device under test (DUT).

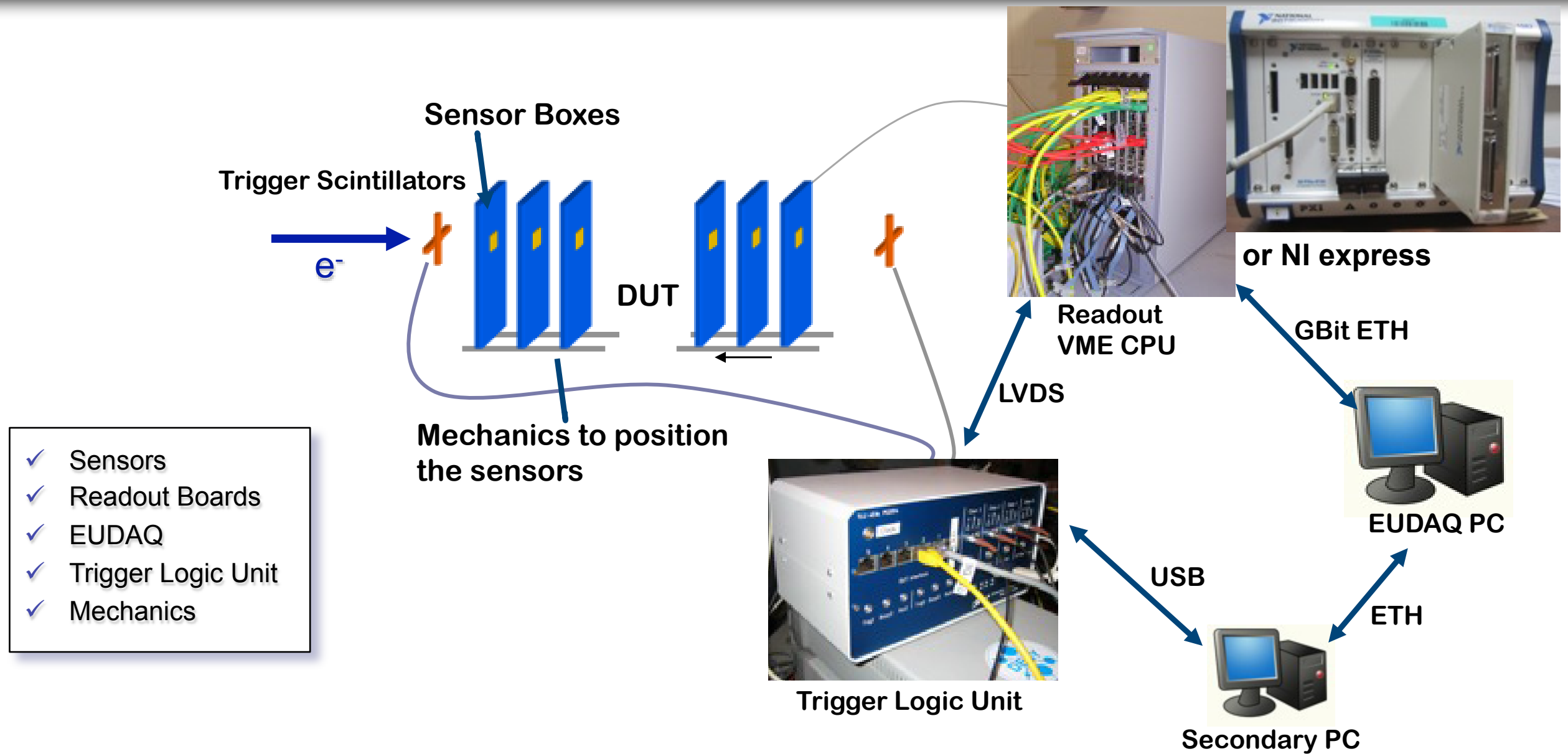
Generally applicable:

- DUTs: from small pixel sensors to larger detectors
- Movement of device under test (DUT) to scan larger surface
- Large range of conditions: cooling, positioning, (B-Field)
- Easy to use: well defined/described interface
- Very high precision: $<3 \mu\text{m}$ precision even at smaller energies (DESY)
- Mobile !

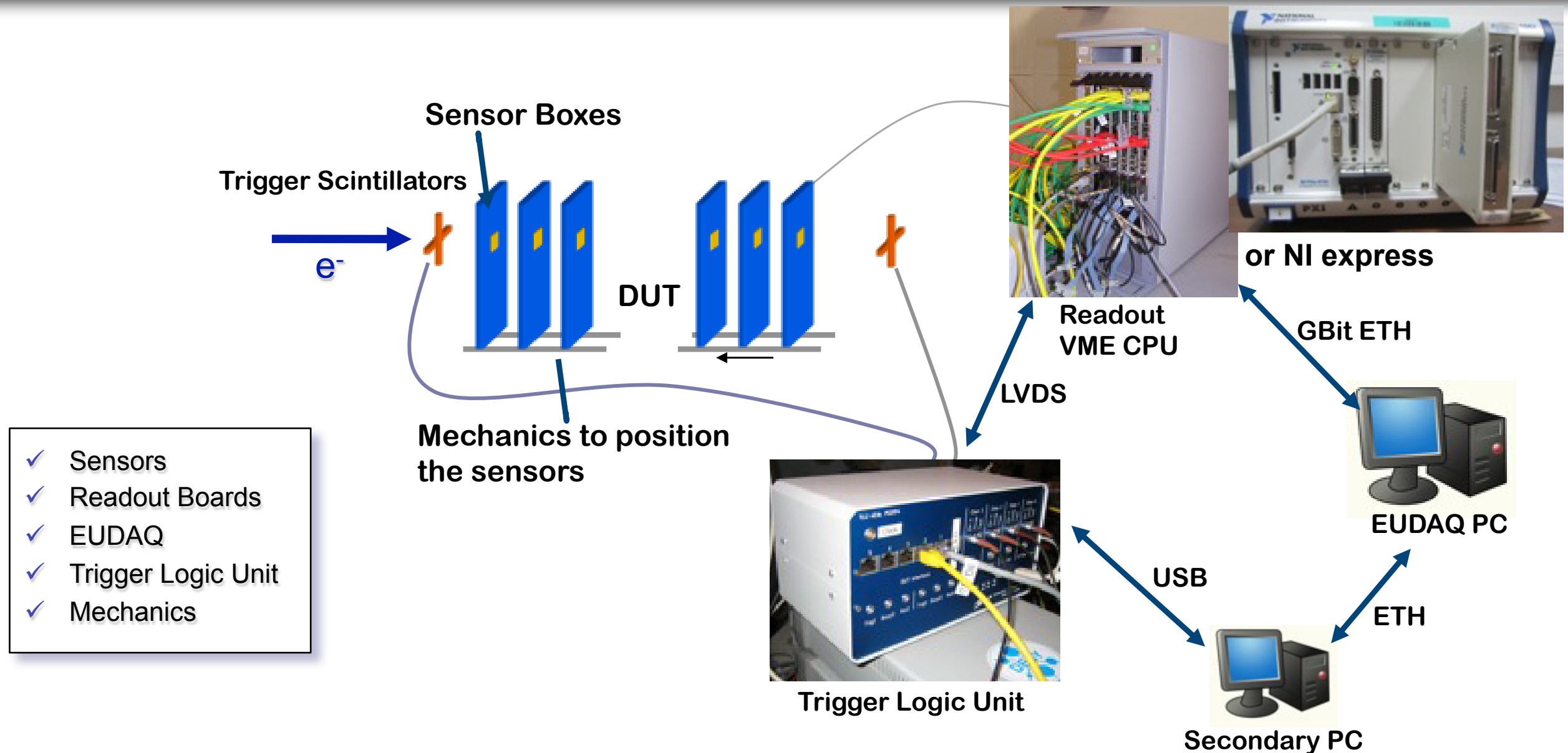


... plan when we started out with the EUDET telescope in 2006

Telescope Ingredients



Telescope Ingredients

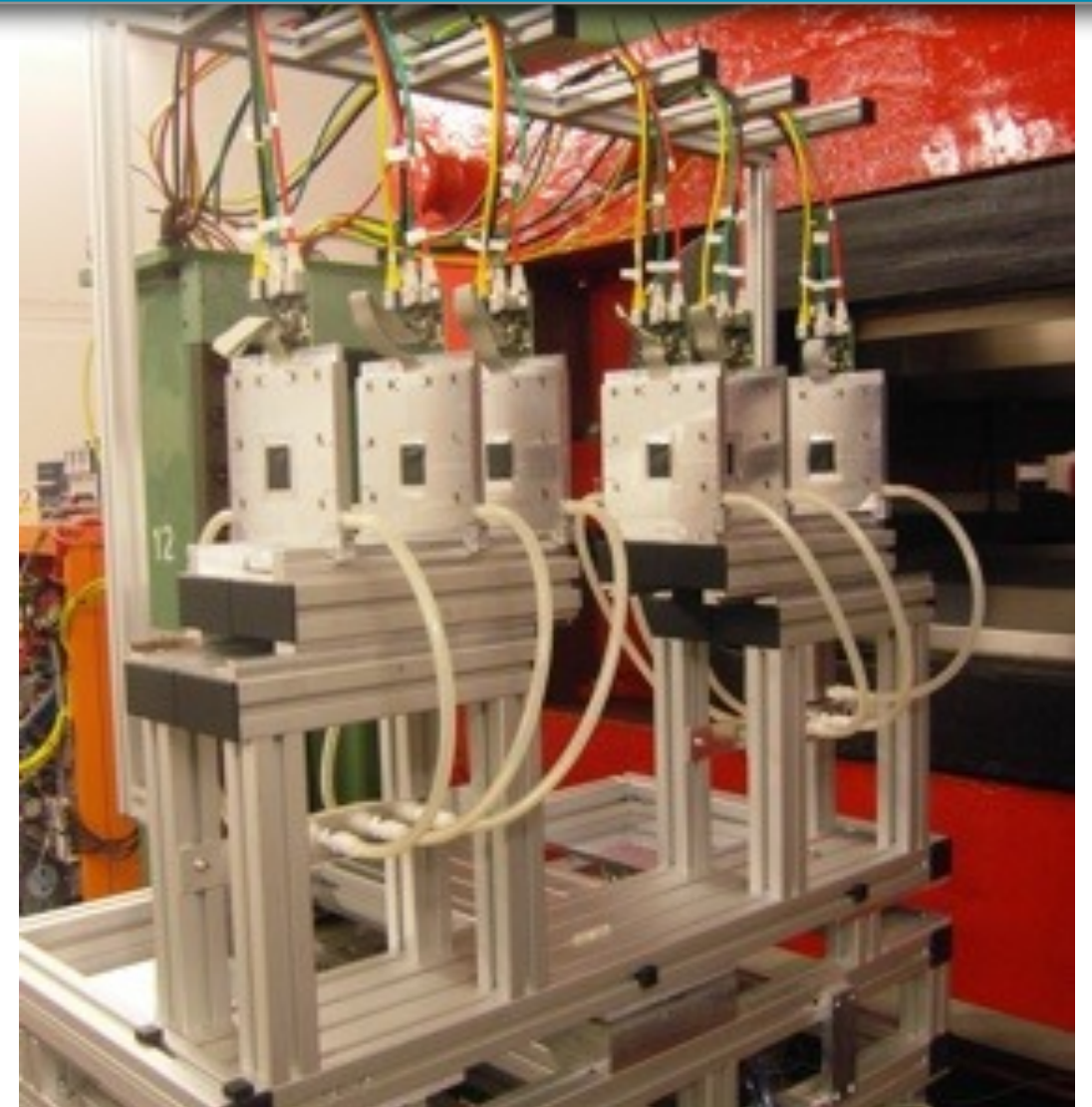


Important

- Use of DAQ software and analysis software which is also general applicable and easy to use
- EUDAQ -> highly modular multi threaded software to implement existing DAQ “easily”
- EUTelescope -> Generic Pixel Telescope Data Analysis Software based on ILCSoft
- developed for our telescope but much more versatile

Telescopes !!

- More successful than anticipated
- Ended up with building 5 telescope and we are planning #6
- EUDET
 - the original !
- ANEMONE
 - copy for Bonn (owners)
- ACONITE
 - copy for ATLAS (owners) currently in TB22
- DATURA
 - copy for DESY currently in TB21
- CALADIUM
 - copy for Carlton, preparation for shipping ongoing
- DRYOPTERIS
 - copy for DESY



But

- Many telescope means also a lot of work
- Alone between February and September 2013 about 50 weeks of data taking
 - a lot of data will be accumulated
- EUTelescope (and also EUDAQ) needs to be maintained to make sure it does not get diluted or too many different versions being created (possibly not correct anymore)
- Tremendous effort by EUTelescope Team to get new release and documentation
- Goals of this workshop
 - getting to know each other
 - sharing TB- and analysis experience and expertise
 - combining and coordinating our efforts



Please use WiFi SSID EUTelescopeWorkshop2013, WPA/WPA2-PSK: KP4Wt9vX

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