# Comparison of EPOS with other intense Positron facilities


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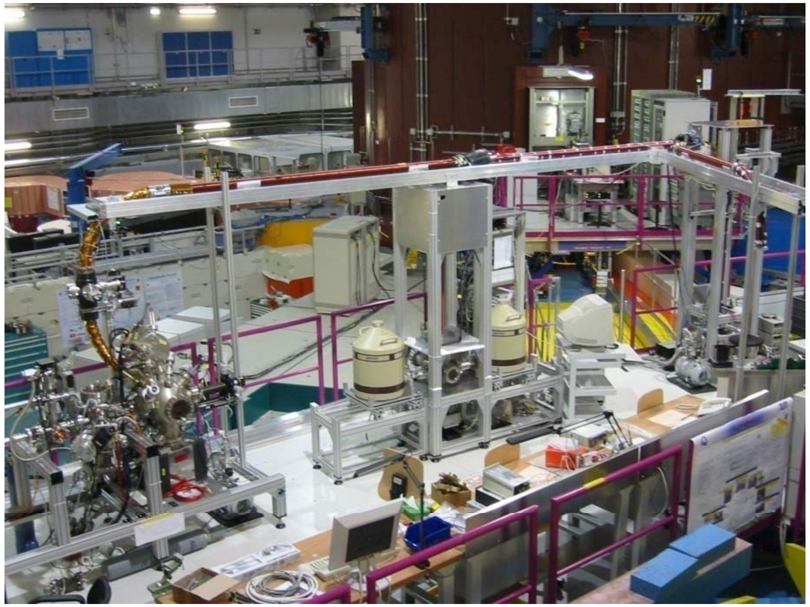
- 10 reactor- or LINAC-based Positron facilities worldwide (many are under construction)
- 3 are running in regular mode (Delft, Munich, Tsukuba)
- 2 provide positron lifetime spectroscopy

# Positron Beam Facilities

**NEPOMUC at FRM-II, Garching, Germany**

- 5 beamlines; 4 already in use
  - $^{113}Cd\ (n,\gamma)\ ^{114}Cd$
  - PLEPS: lifetime spectrometer is working horse
  - Concidence Doppler Broadening
  - PEAS (Positron Annihilation induced Auger Spectroscopy)
  - Positron Microscope (not installed)
  - User port
  - Financial support for EU visitors
- Problems with a magnet of a neutron experiment, time must be shared
- Febr. 08: 25 projects applied for 170 days (45 days available)



Experimental platform

# Positron Beam Facilities

- **Argonne Project APosS @ Argonne National Laboratory**
  - Linac: 15.5 MeV, 0.1 mA, 60 Hz, 1.5 kW
  - First positrons detected – up to $3 \times 10^9$ $e^+$/s expected
- **SOPHI Project in Saclay** – Mini LINAC for Gravity Experiment with Anti-H
  - Tabletop commercial accelerator: 6 MeV, 300 Hz, 0.2 mA; 10 kW
  - Under construction (solid Ne moderator possible)
  - Aim $10^8$ $e^+$/s
- **North Carolina State University** PULSTAR Reactor
  - For the "study of nanophase in matter"
  - In US 21 university research reactors; PULSTAR power 1 MW
  - $6 \times 10^8$ positrons/s expected in 2008

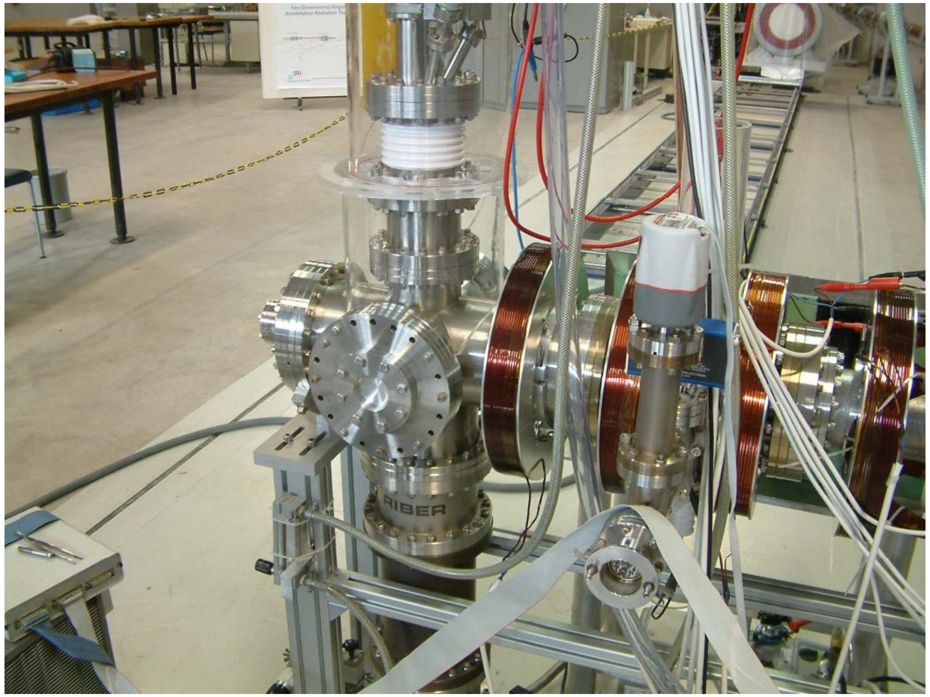
# Positron Beam Facilities

- **Positron Microbeam for Transmission Positron Microscope** at KEK (large Japanese Collaboration), Tsukuba, Japan
  - Linac-based positron source
  - 60 µm diameter after remoderation
  - Continuous beam
- **Positron Beam at IHEP (Inst. for High Energy Physics), Beijing China**
  - Many promising activities: lifetime, AMOC, CDBS
  - Isotope and LINAC-based bunched slow positron beams
- **Positron Probe Micro Analyser (PPMA) at LINAC in AIST** (Tsukuba)
  - 100 µm beam (10µm expected); lifetime; 200…300 s/ pixel; 200ps FMHM expected
- **Australian Positron beam Facility**
  - 2 beam lines: materials science & atomic/bio/molecular
  - Materials beam line under construction; aim: bunched 200ps FWHM; $10^7$ $e^+$/s

# Positron Beam Facilities

- **University Delft – Research Reactor Positron Source**
  - Continuous positron beam
  - One user port
  - Used for ACAR (Angular Correlation of Annihilation Radiation)

Beamline > 20 m, detector distance about 2x 10m




Sample chamber

# Comparison of EPOS

**Advantages of EPOS**

- Only pulsed positron source (<5ps pulse width at W $e^-/e^+$ converter)
- High brilliance of primary electron source (40 kW; > $10^8$ $e^+$/s ecpexted)
- Full digital detector system (many advantages: no manual adjustments; pulse shape discrimination; sophisticated software CF-timing; exact time scale …)
- Only multi-detector system so far (high count rate; better time resolution; much better peak-background ratio; possibility of coincidence detection)
- Fast access to converter chamber (in contrast to reactor-based systems)

**Drawbacks**

- Small experimental space in Room 111d (≈25 $m^2$); only one experimental vacuum chamber, but all techniques for material science (lifetime, Doppler and AMOC)
- but no ACAR (but could be installed on top of cave; possibility of depth and time resolved ACAR spectrometer)
- EPOS must share time with 5 other experiments (however: 22-Na source for Doppler broadening experiments when electron beam is not available)