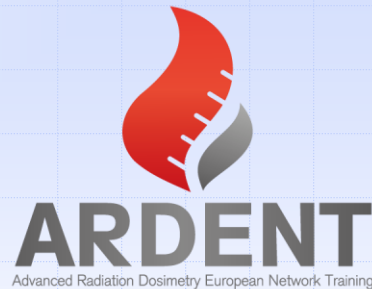


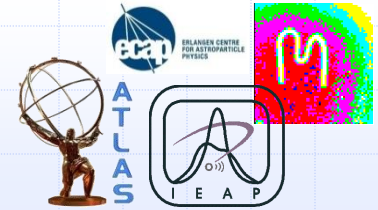
Activities within the ARDENT- project: November 2012 – June 2013

Benedikt Bergmann

Institute of Experimental and Applied Physics, Czech Technical University in Prague, Czech Republic

CERN - 06/13/13

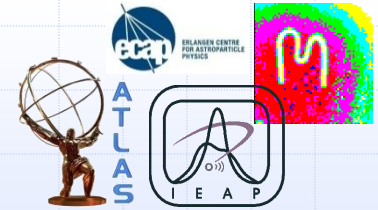




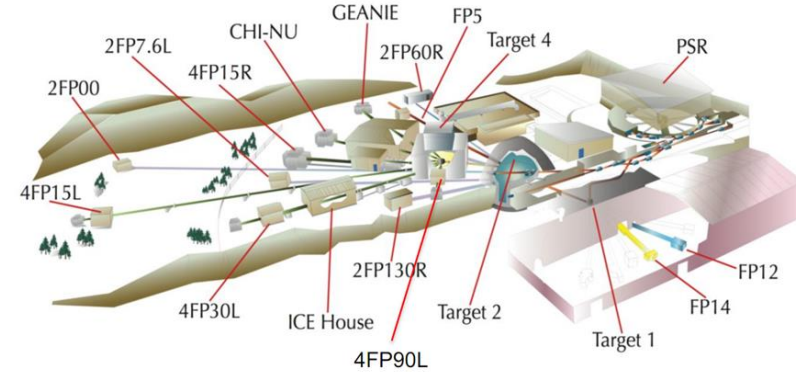
Experimental Activities

- ❑ Measurement at CMI (Czech Metrological Institute) with TPX device in different neutron fields (AmBe, Cf-252)
- ❑ LANSCE (Los Alamos Neutron Science Center) neutron spallation source
 - Using Time-of-Arrival Mode of TPX to apply Time-of-Flight technique
 - See following slides
 - Results will be presented at IWoRiD
- ❑ Calibration of TPX device at Van-de-Graaff accelerator in Prague (14MeV neutrons)
- ❑ Exposure of TPX to different radiation fields with well defined dose rates at SURO (National Radiation Protection Institute) in Prag
- ❑ Measurement in proton fields with different energies at DKFZ (German Center for Cancer Research) in Heidelberg
 - TPX was perpendicular irradiated with monoenergetic protons (energies 48MeV, 150MeV and 221MeV)

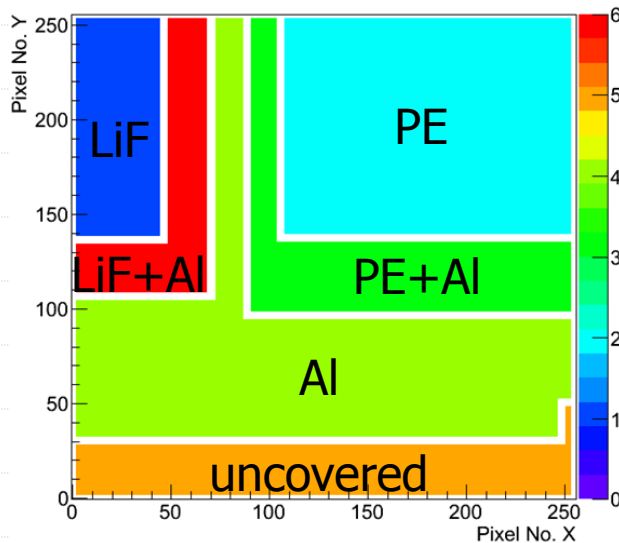
LANSCCE – Los Alamos Neutron Science Center



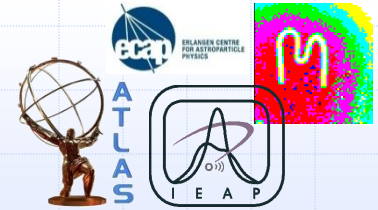
- Neutron beam from spallation source:
 - Pulsed beam with repetition rate 1.8 μ s (micropulses)
 - Kinetic neutron energies up to 800MeV
 - Reference neutron fluence was provided by a fission chamber



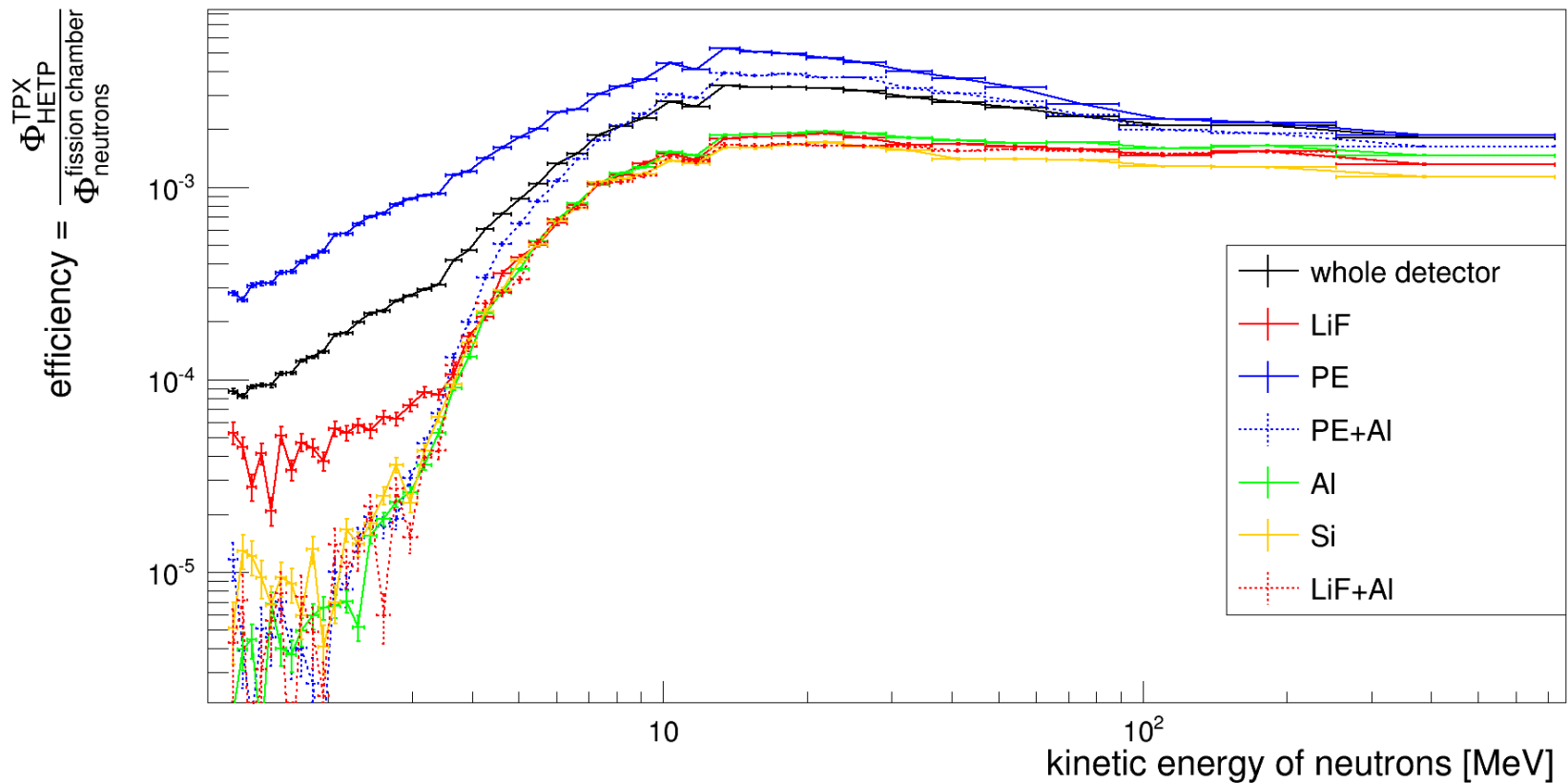
- TPX-detector with conversion layers for enhanced neutron detection
 - Time-of-Arrival mode permitted application of the Time-of-Flight technique



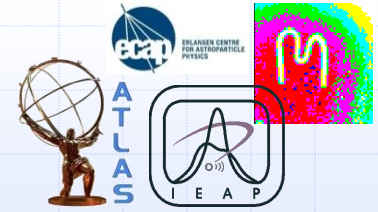
LANSCCE – Neutron Detection Efficiency over Energy for Different Regions



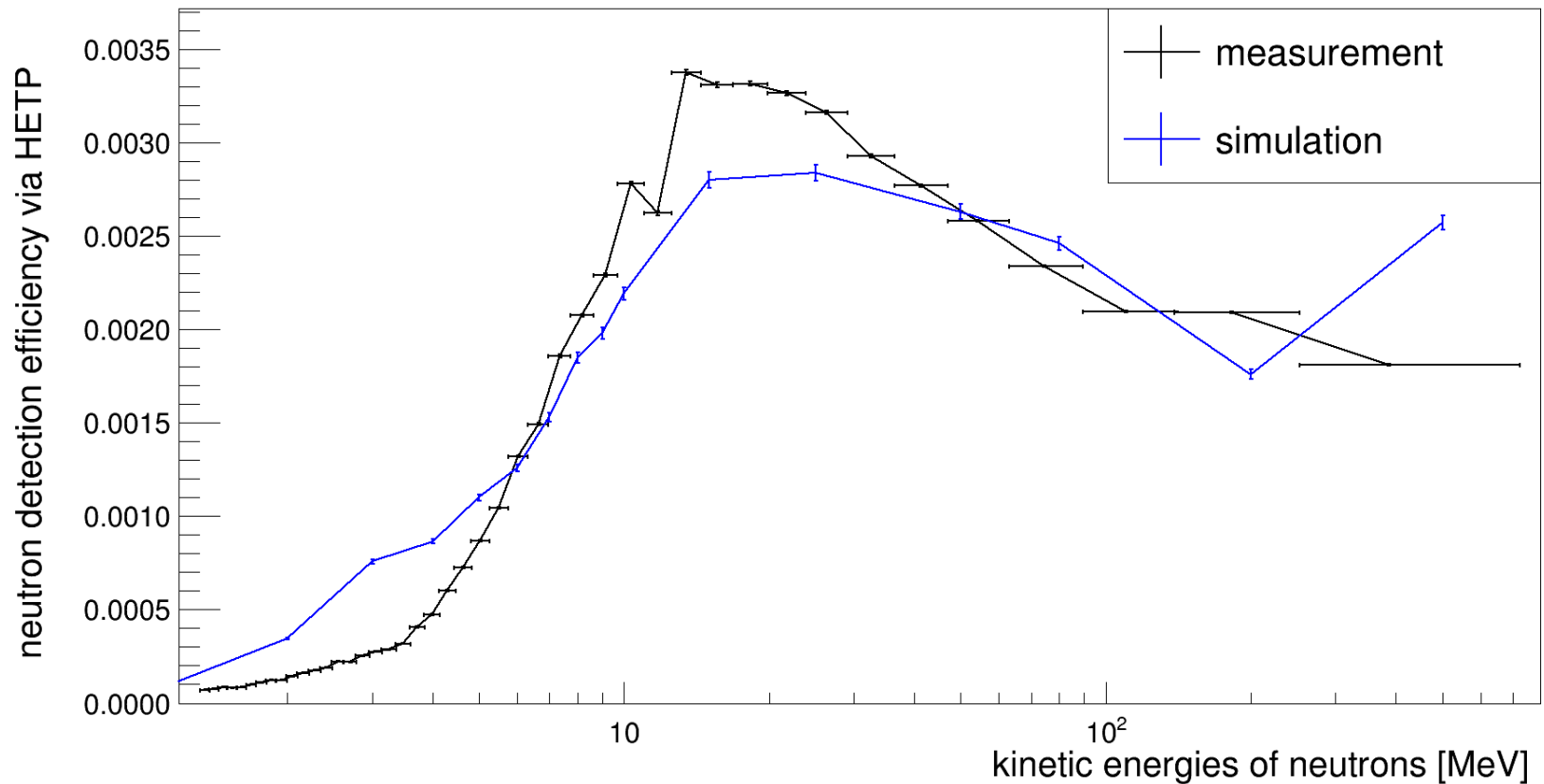
- Pattern recognition tool identified clusters and put them into different categories:
 - Neutrons are detected as “High Energy Transfer Particles”, i.e. “Heavy Blobs” (big clusters with rounded shapes) or “Heavy Tracks” (big clusters with elliptical shapes) due to recoiled protons below PE and/or reactions in the Silicon itself



Neutron Detection Efficiency - Comparison with simulation



- ❑ Measured neutron detection efficiency important input/verification for the simulation over a wide energy range
- ❑ Maximum deviation $\sim 30\%$



Conferences, workshops and presentations



- ❑ 1st Annual ARDENT workshop in Vienna:
 - “Introductory presentation”

- ❑ MPX meeting CERN:
 - “The ARDENT project and MPX detectors”

- ❑ ECAP Seminar in Erlangen:
 - “The ARDENT Project and Neutron Detection with TPX Detctors”

- ❑ Tagung der Deutschen Physikalischen Gesellschaft (= Annual Conference of the German Physical Society) in Dresden:
 - “Studies on Activation in the ATLAS cavern with MPX Detectors” (see next slide)

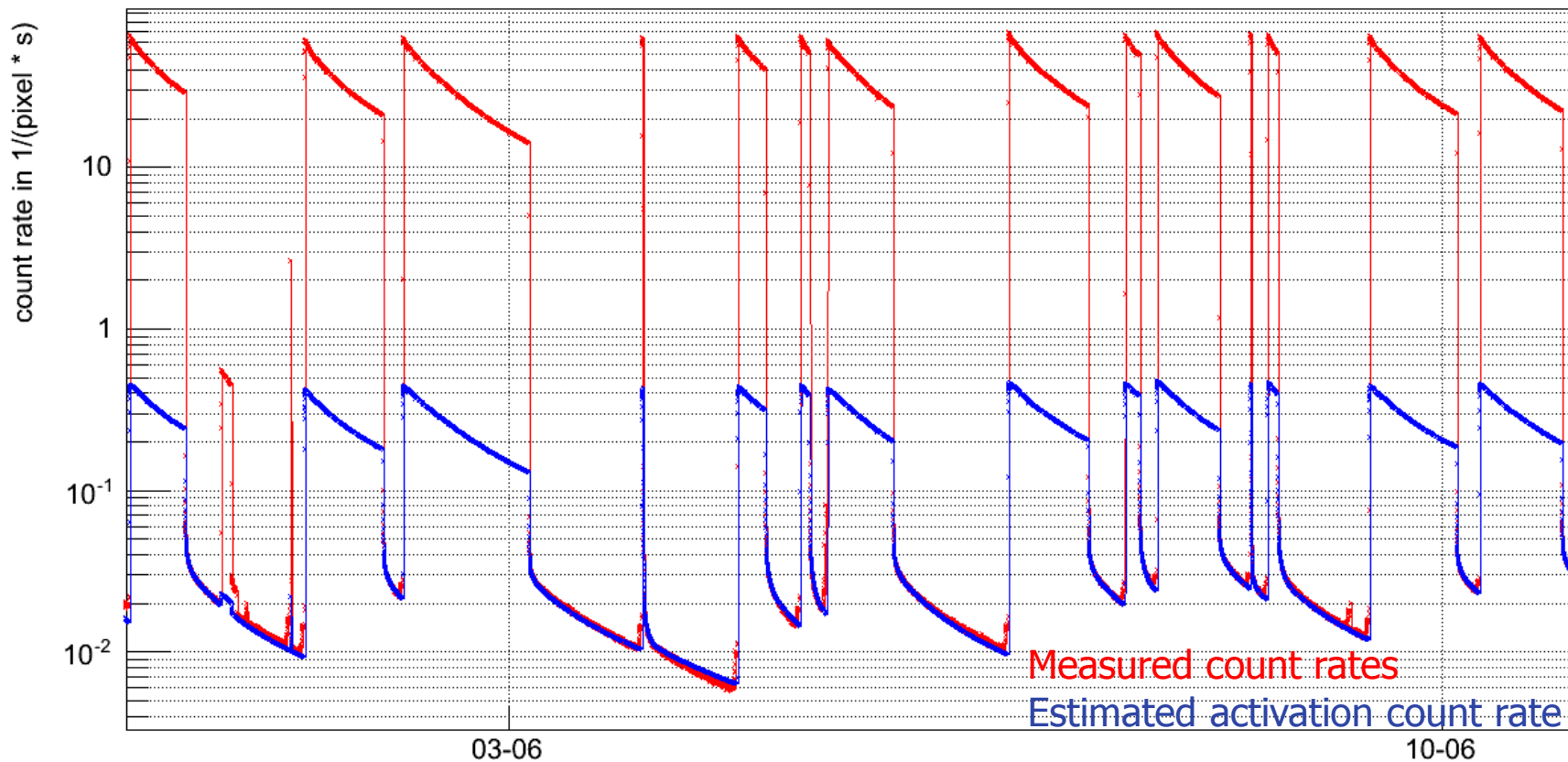
- ❑ Joint International Workshop on Off-Site Gamma Dose Rate and Ground Contamination Measurements

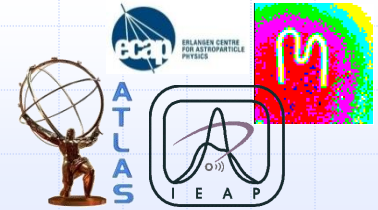
- ❑ Reports and presentations in the restricted weekly meeting of ATLAS MPX detector group: access to the presentations can be given by request!

Studies on Activation in the ATLAS cavern with MPX Detectors – Measured Count Rates and Modelled Activation



- Contribution of the count rate due to activation
 - During collisions $\sim 1\%$
 - After collision: 100%





Other Training and Activities

- ❑ Czech language training
 - 4.5 hours once a week!
- ❑ Training and test on management and radiation safety at Los Alamos Neutron Science Center
- ❑ Working on a publication together with Dr. Thilo Michel (University Erlangen)
 - "Measurement of the double K-Shell vacancy creation probability in the electron capture decay of Fe-55 with a photon counting pixel detector"
 - Expected to be finished soon!

See also:

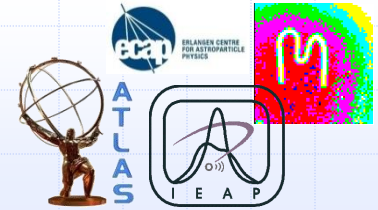
<https://ardent.web.cern.ch/ardent/ardent.php?link=esr09>

<https://ardent.web.cern.ch/ardent/ardent.php?link=esr09-logbook>

And presentations:

<https://ardent.web.cern.ch/ardent/ardent.php?link=dissemination>

Future Activities



- ❑ Experimental:
 - Perform measurements in different proton fields (following up the measurements, I already did at DKFZ in Heidelberg) – Pavia, CNAO?
 - Submitted proposal for a second beam time in Los Alamos (LANSCE): Investigate a wider energy range (especially to lower energies)

- ❑ Conferences and workshops:
 - Poster contribution at IWoRiD: "Time-of-Flight Measurement of Fast Neutrons by Means of Timepix Detectors"
 - 2nd ARDENT workshop in Milano

- ❑ Other Training:
 - Czech language courses – ongoing

Thank you for your attention!

