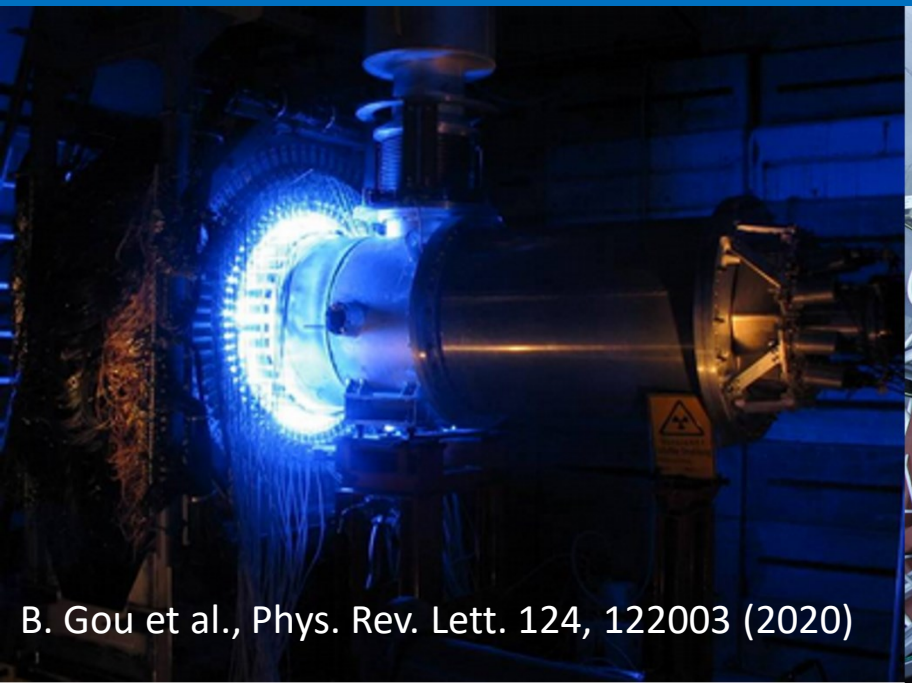
Publication of the A4-Data according to FAIR-principles

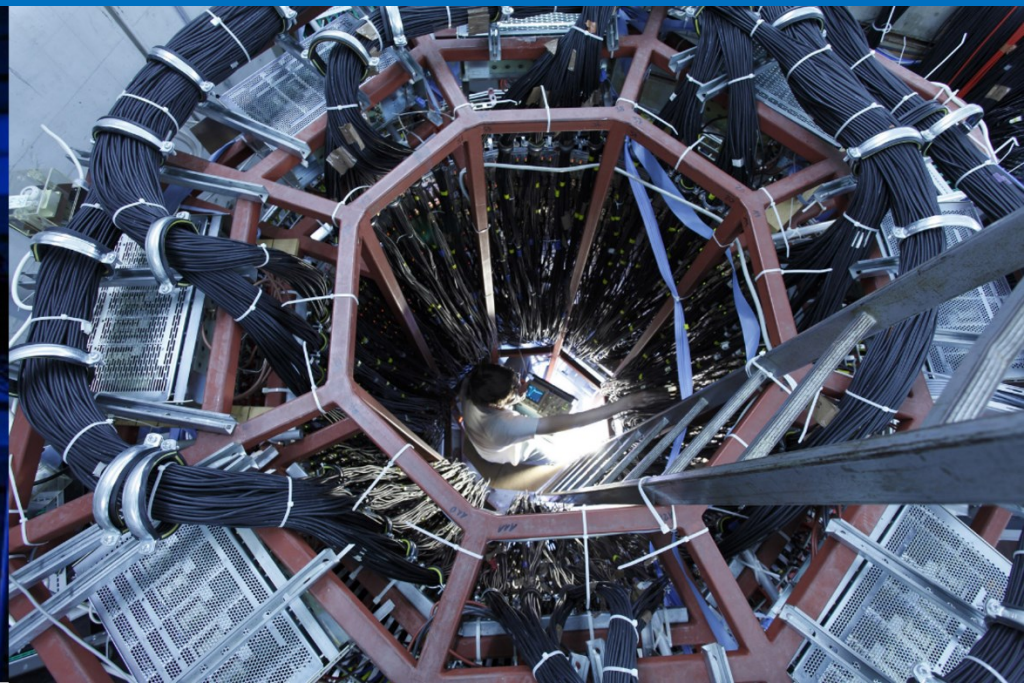
Sebastian Baunack, Luigi Capozza, Boxing Gou,
Gerrit Günther, Frank Maas, Oonagh Mannix, Malte Wilfert

PATOF meeting

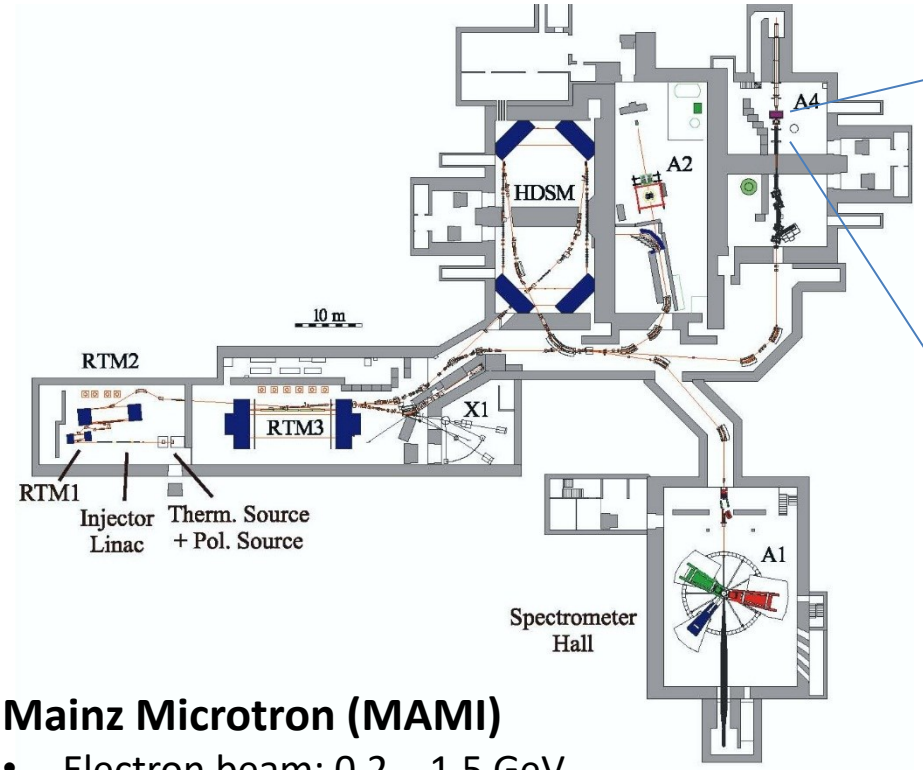
February 05, 2024

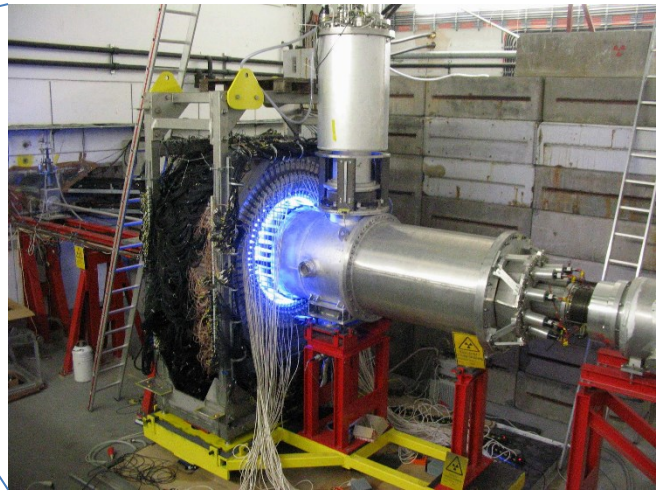


B. Gou et al., Phys. Rev. Lett. 124, 122003 (2020)



A4 at MAMI





Mainz Microtron (MAMI)

- Electron beam: 0.2 – 1.5 GeV
- Beam current: 20 μA
- Polarization ~ 80%

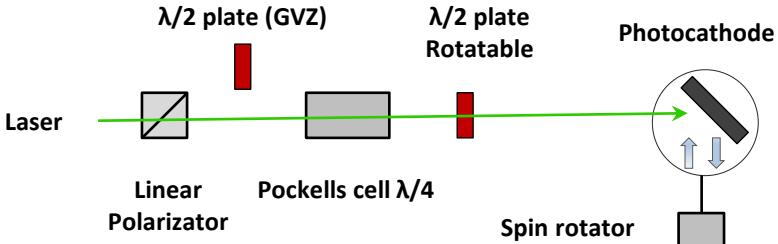
A4 experiment

- Beam single-spin asymmetries ($\sim 10^{-6}$)
- Single-arm counting spectrometer (θ and E of e^-)
- Rate: 100 MHz, pile up $\leq 1\%$

Physics case

- $\vec{e}$: **Strange form factor of the proton**
  - Search possible strange quark contribution to proton structure
- $e^{\uparrow}$: **Two-photon exchange**
  - Contribution of two-photon exchange amplitudes to electron scattering
  - High order quantum correction

A4 experiment setup



Spin rotator
(Wien filter)

4 cascaded microtrons

Møller polarimeter (A1)

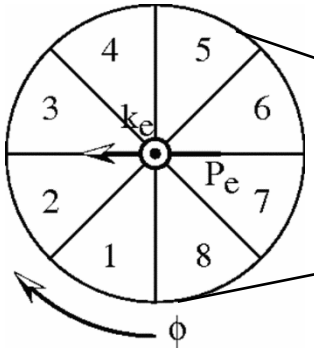
Compton backward
scattering polarimeter

Liquid target (H_2/D_2)

Transmission Compton polarimeter

Beam dump

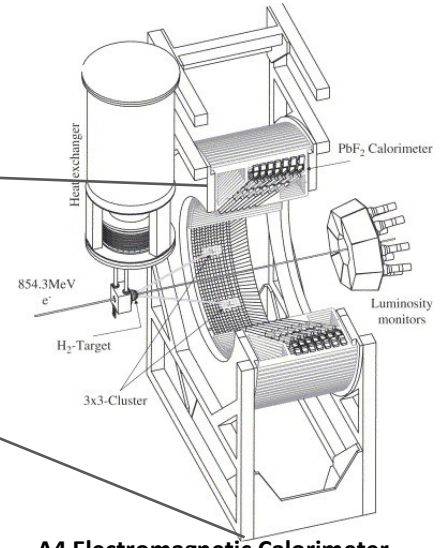
Accelerator monitors



Luminosity monitor

- 8 water Cerenkov counters

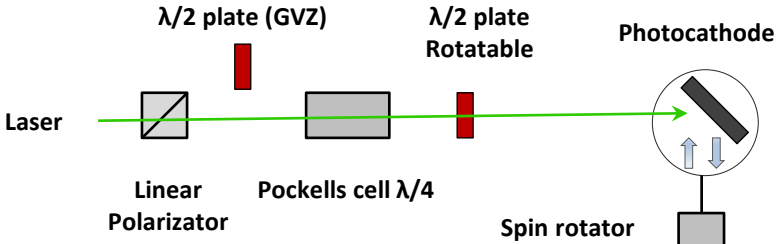
Main detector: asymmetries



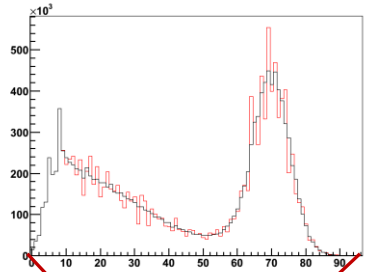
A4 Electromagnetic Calorimeter

- EMC: 7x146 PbF_2 crystals

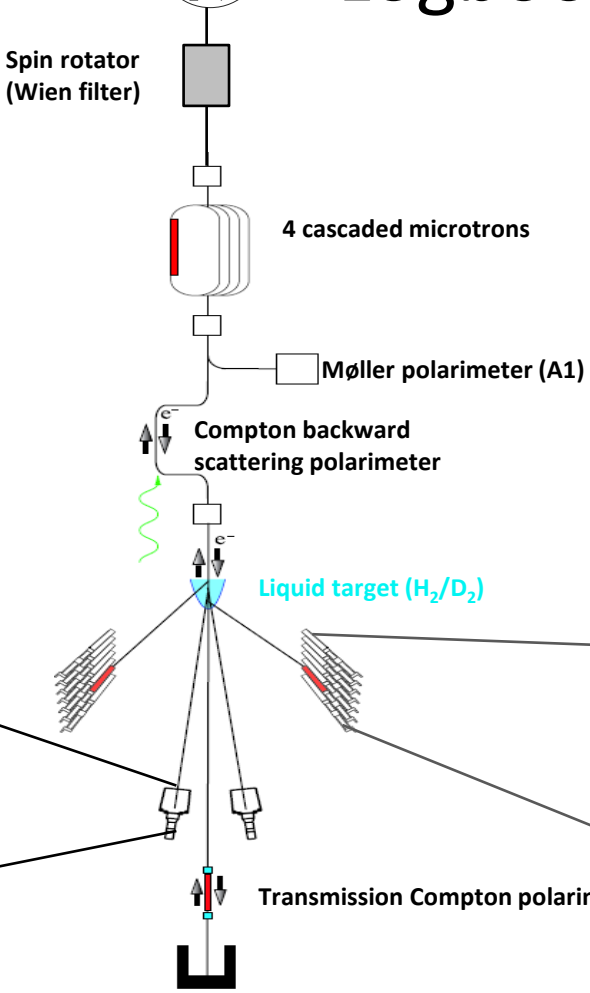
A4 data



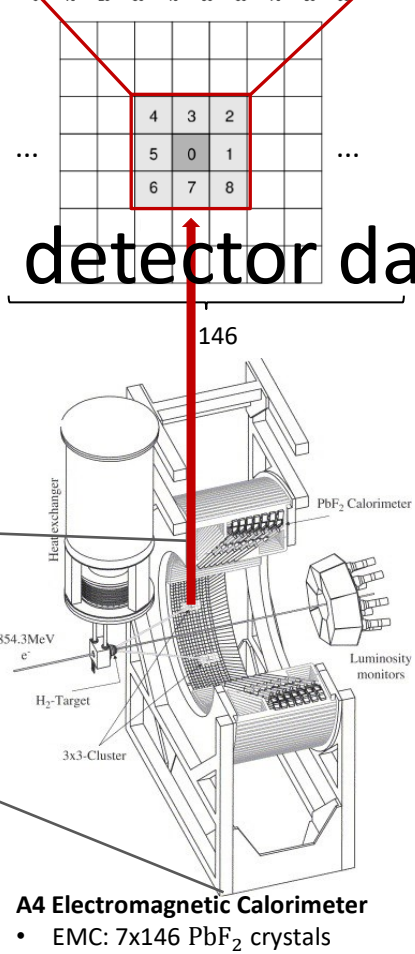
Logbook data

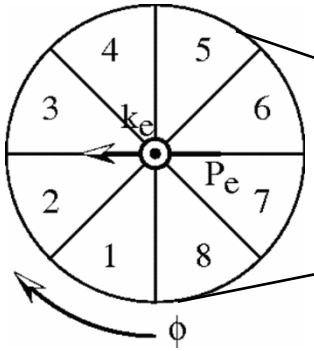


Accelerator monitor data



Main detector data





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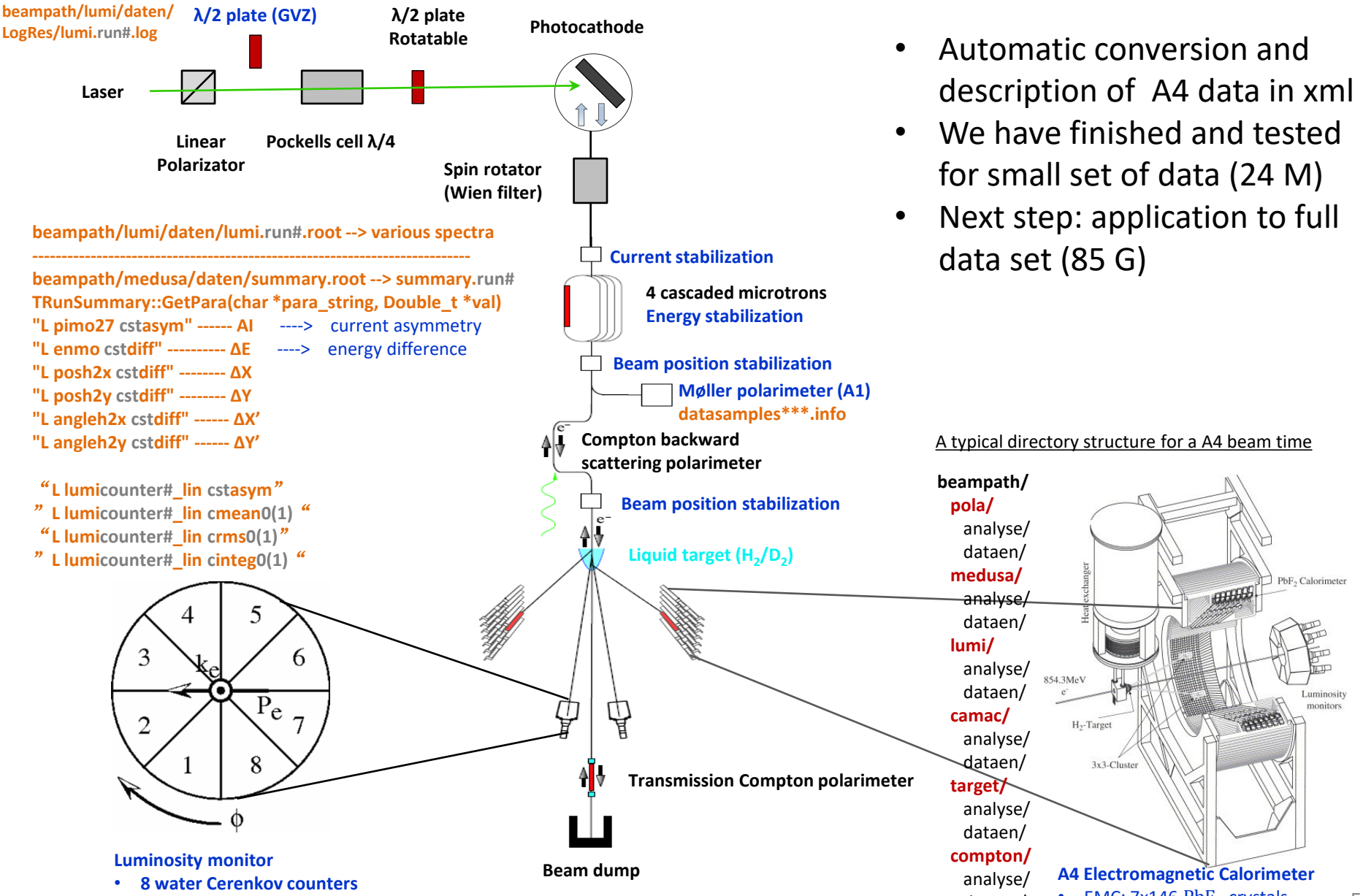

- Automatic conversion and description of A4 data in xml
- We have finished and tested for small set of data (24 M)
- Next step: application to full data set (85 G)

Status

A4 dataset

Boxing Gou, Frank Maas

Abstract

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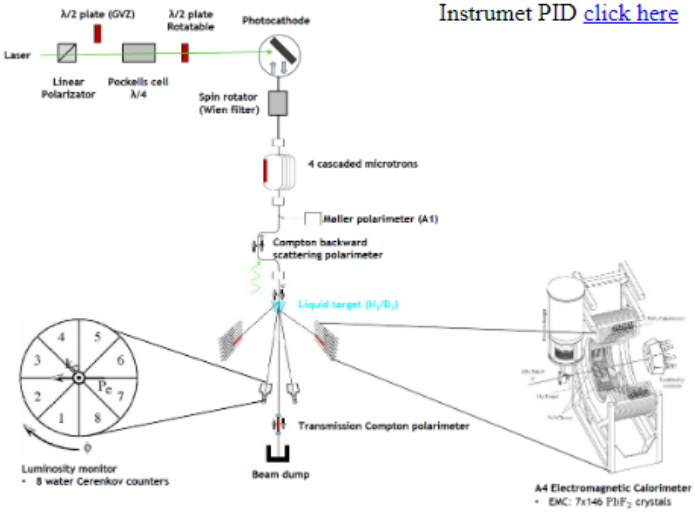

Instrumet PID click here

Included Data Sets

File	Description
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_conversion_report\report_data_converter.html	Report log file of data converter.

References

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- Preparation of landing page
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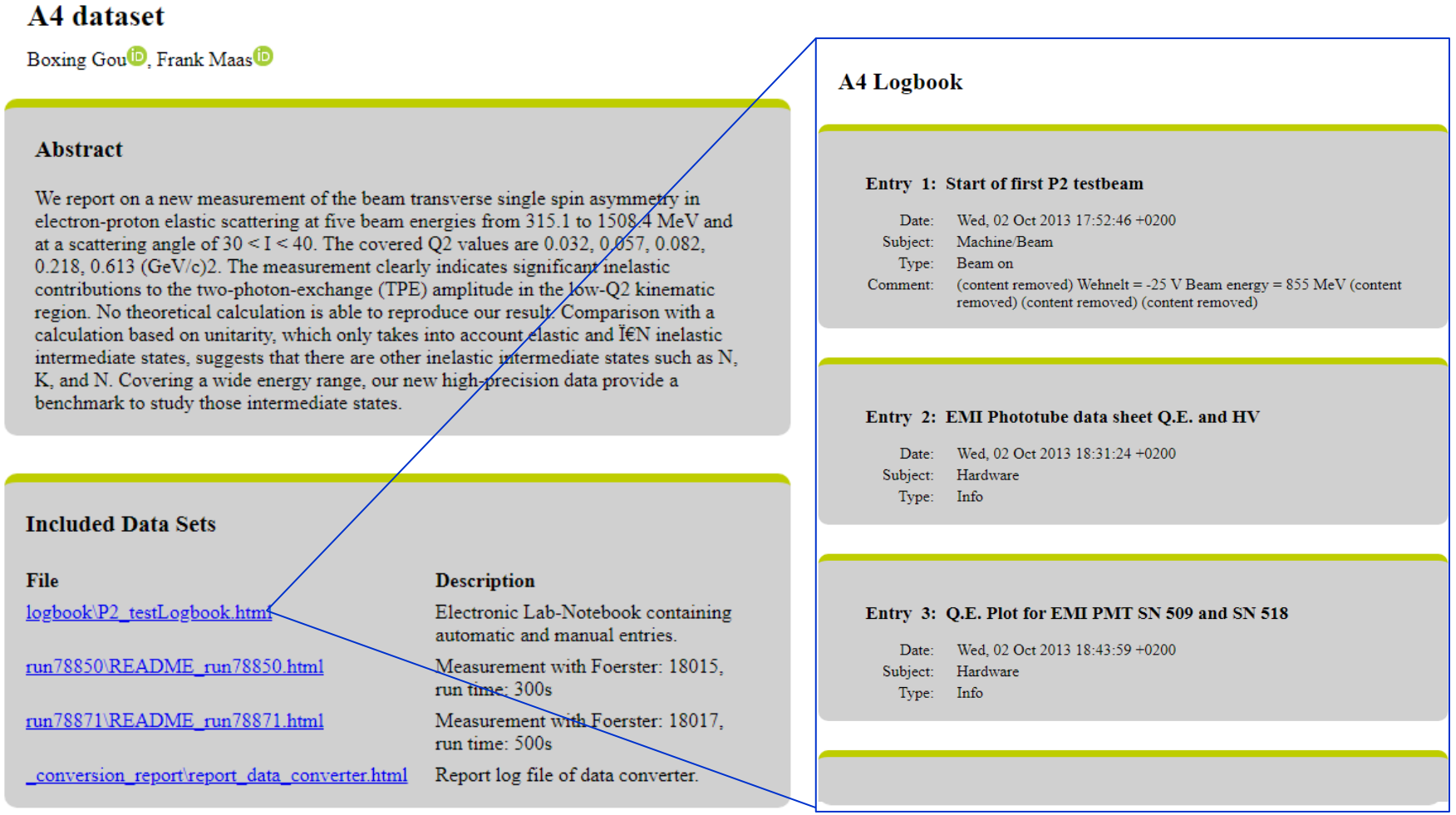

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A4 Logbook

Entry 1: Start of first P2 testbeam

Date: Wed, 02 Oct 2013 17:52:46 +0200
Subject: Machine/Beam
Type: Beam on
Comment: (content removed) Wehnelt = -25 V Beam energy = 855 MeV (content removed) (content removed) (content removed)

Entry 2: EMI Phototube data sheet Q.E. and HV

Date: Wed, 02 Oct 2013 18:31:24 +0200
Subject: Hardware
Type: Info

Entry 3: Q.E. Plot for EMI PMT SN 509 and SN 518

Date: Wed, 02 Oct 2013 18:43:59 +0200
Subject: Hardware
Type: Info

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run78850

Boxing Gou, Frank Maas

Abstract

Subject: Run, Type: Start, Run purpose: asymmetry, Run comment: data, Run time: 300s, Foerster: 18015

Included Data Sets

File	Description
medusa\daten\info_78850.xml	Preliminary fit parameters for energy spectrum of scattered particles.
medusa\daten\info.78850	Source data (ASCII) of info_78850.xml.
medusa\daten\HighVoltages\voltages_run78850.xml	Record of voltage applied to photomultiplier of a channel.
medusa\daten\HighVoltages\voltages_run78850	Source data (ASCII) of voltages_run78850.xml.
medusa\daten\Thresholds\thresholds_run78850.xml	Configuration of detector electronics, e.g. to suppress background and avoid signal pile up.
medusa\daten\Thresholds\thresholds_run78850	Source data (ASCII) of thresholds_run78850.xml.
medusa\daten\medusa_run78850.root	Root file containing medusa detector data. [1)]
medusa\daten\counts_elastic_78850.xml	Preliminary analysis of elastic events.
medusa\daten\counts_elastic.78850	Source data (ASCII) of counts_elastic_78850.xml.

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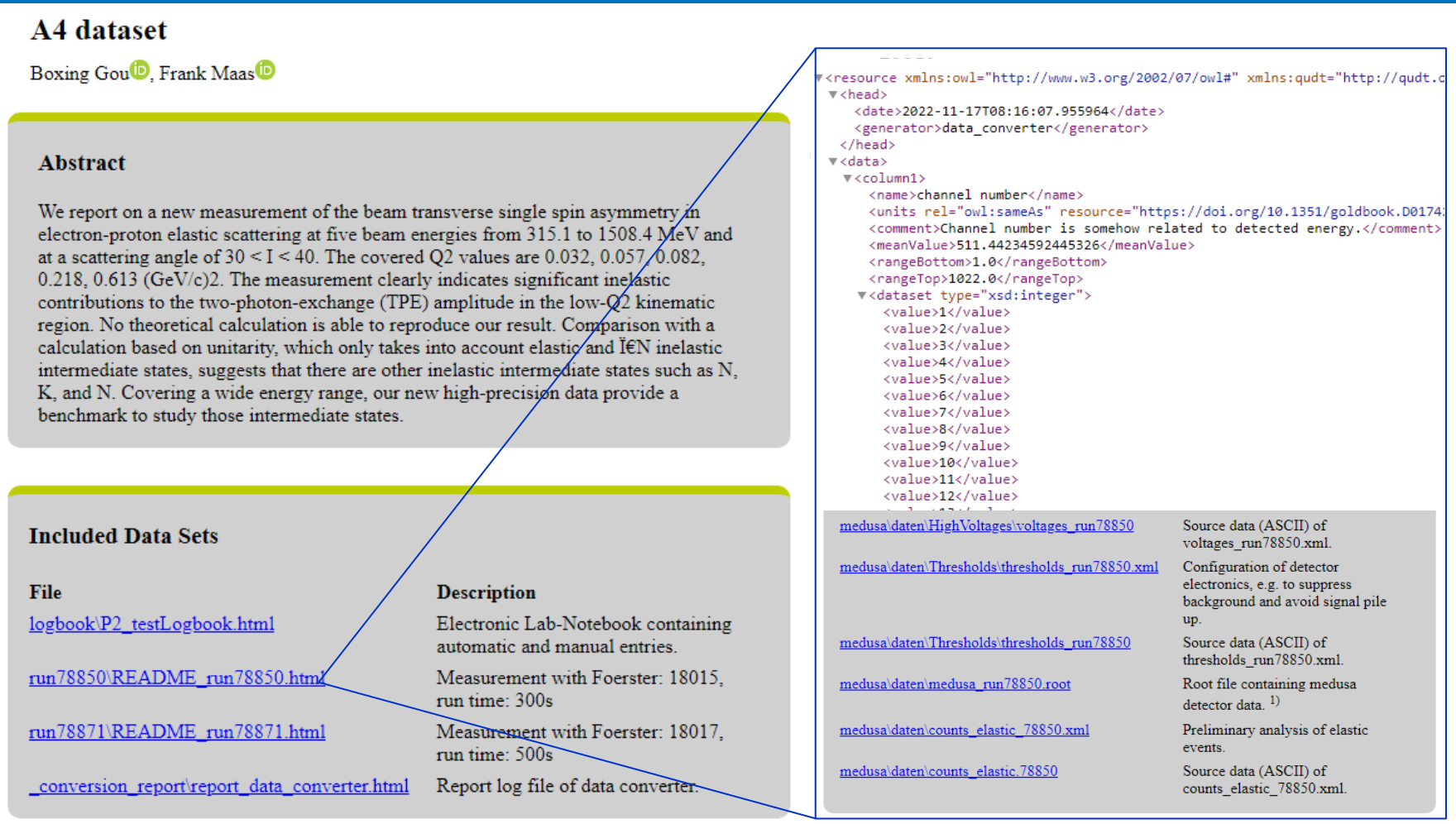

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    <rangeTop>1022.0</rangeTop>
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     <value>8</value>
     <value>9</value>
     <value>10</value>
     <value>11</value>
     <value>12</value>
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Next steps

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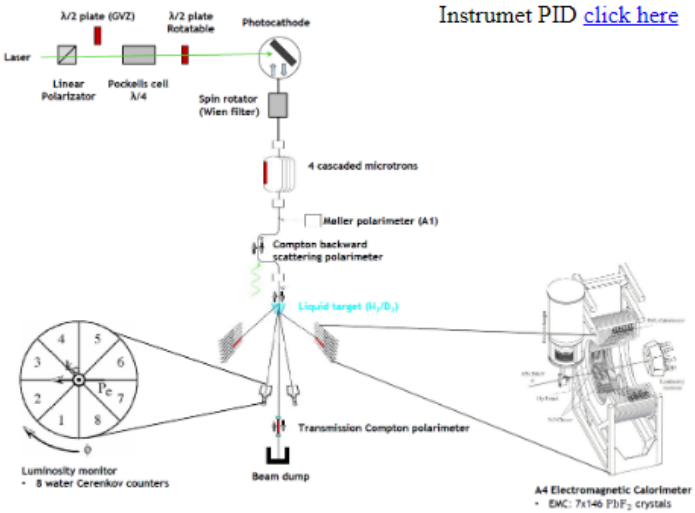

Instrumet PID click here

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- New Measurements of the Beam Normal Spin Asymmetries at Large Backward Angles with Hydrogen and Deuterium Targets,
- A4 instrument,

- Test with larger (complete) dataset (85 G)
- Getting the Persistent Instrument Identification (PID)
- To publish the data

Thanks for your attention