



Carsten B. Krauss  
IPP Town Hall meeting

June 15 2014, Sudbury



# PICO



• I. Lawson, E. Vázquez Jáuregui



M. Ardid, M. Bou-Cabo, I. Felis



NORTHWESTERN UNIVERSITY

D. Baxter, C.E. Dahl, M. Jin



P. Bhattacharjee,  
• M. Das, S. Seth



F. Debris, M. Fines-Neuschild,  
C.M. Jackson, M. Lafrenière,  
M. Laurin, L. Lessard,  
J.-P. Martin, M.-C. Piro,  
A. Plante, O. Scallon,  
N. Starinski, V. Zacek



• R. Filgas, S. Pospisil,  
• I. Stekl



J.I. Collar,  
• R. Neilson,  
• A.E. Robinson



E. Behnke, H. Borsodi,  
C. Harnish, O. Harris,  
C. Holdeman, I. Levine, E. Mann,  
J. Wells



S.J. Brice, D. Broemmelsiek,  
P.S. Cooper, M. Crisler,  
W.H. Lippincott, E. Ramberg,  
M.K. Ruschman,  
A. Sonnenschein

D. Maurya, S. Priya



C. Amole, M.  
Besnier, G. Caria, G.  
Giroux, A. Kamaha,  
A. Noble



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D.M. Asner, J. Hall



S. Gagnebin, C. Krauss,  
D. Marlisov, P. Mitra

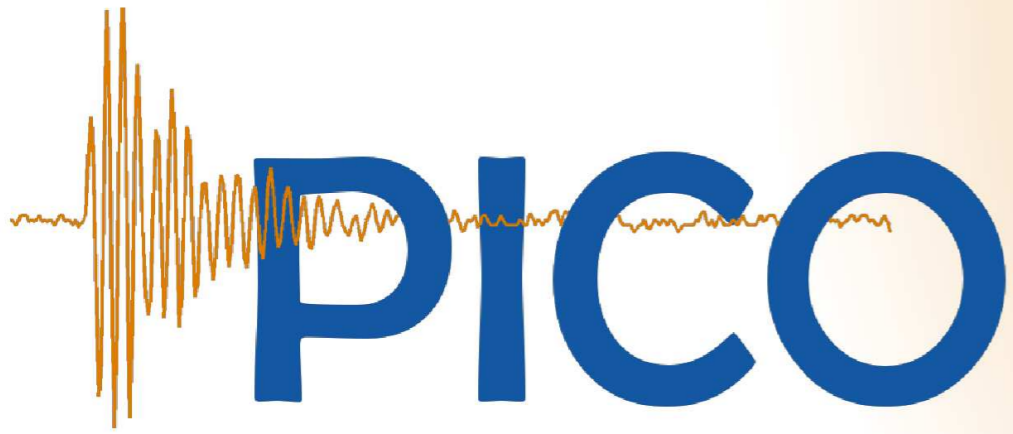


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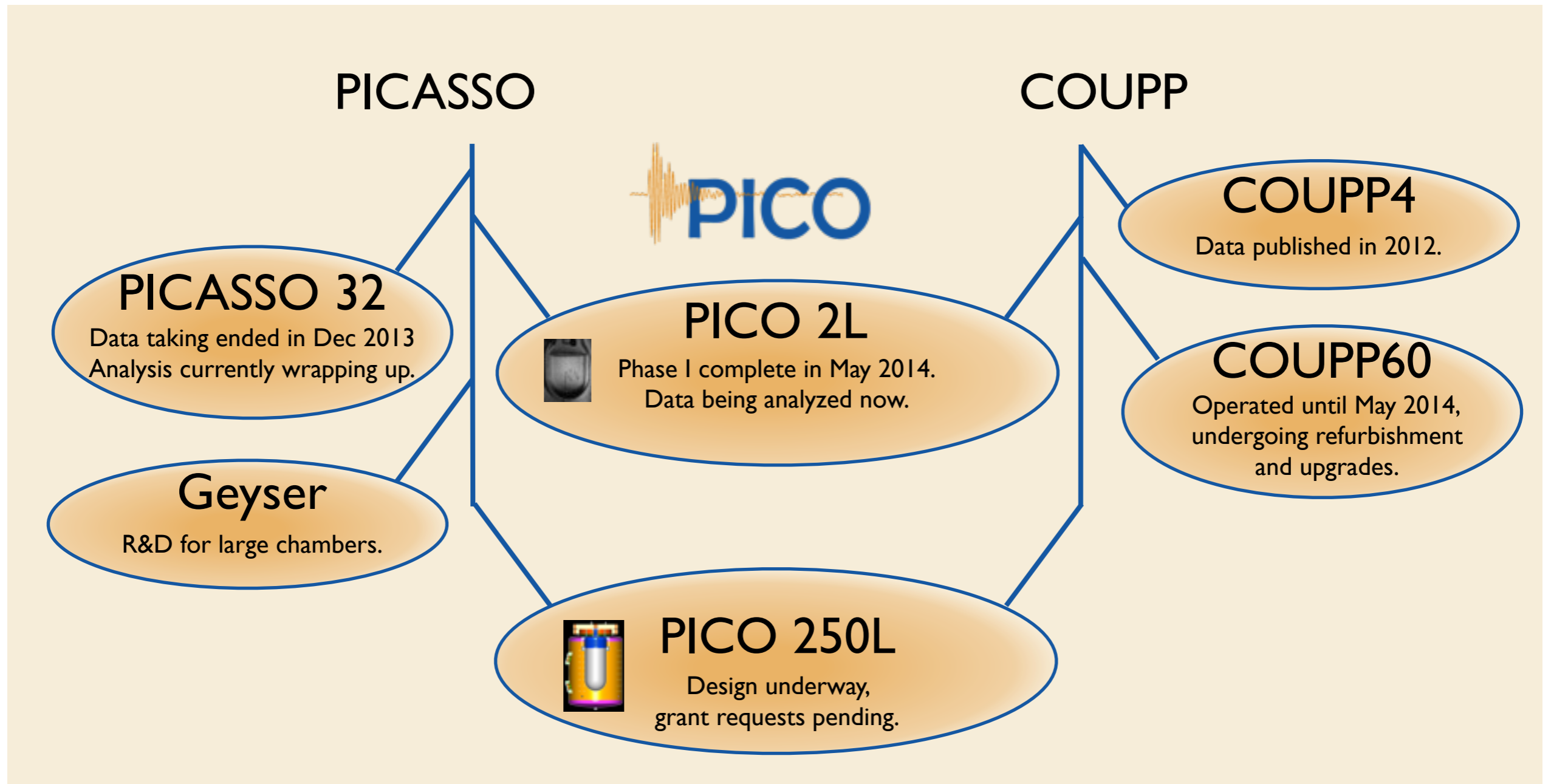
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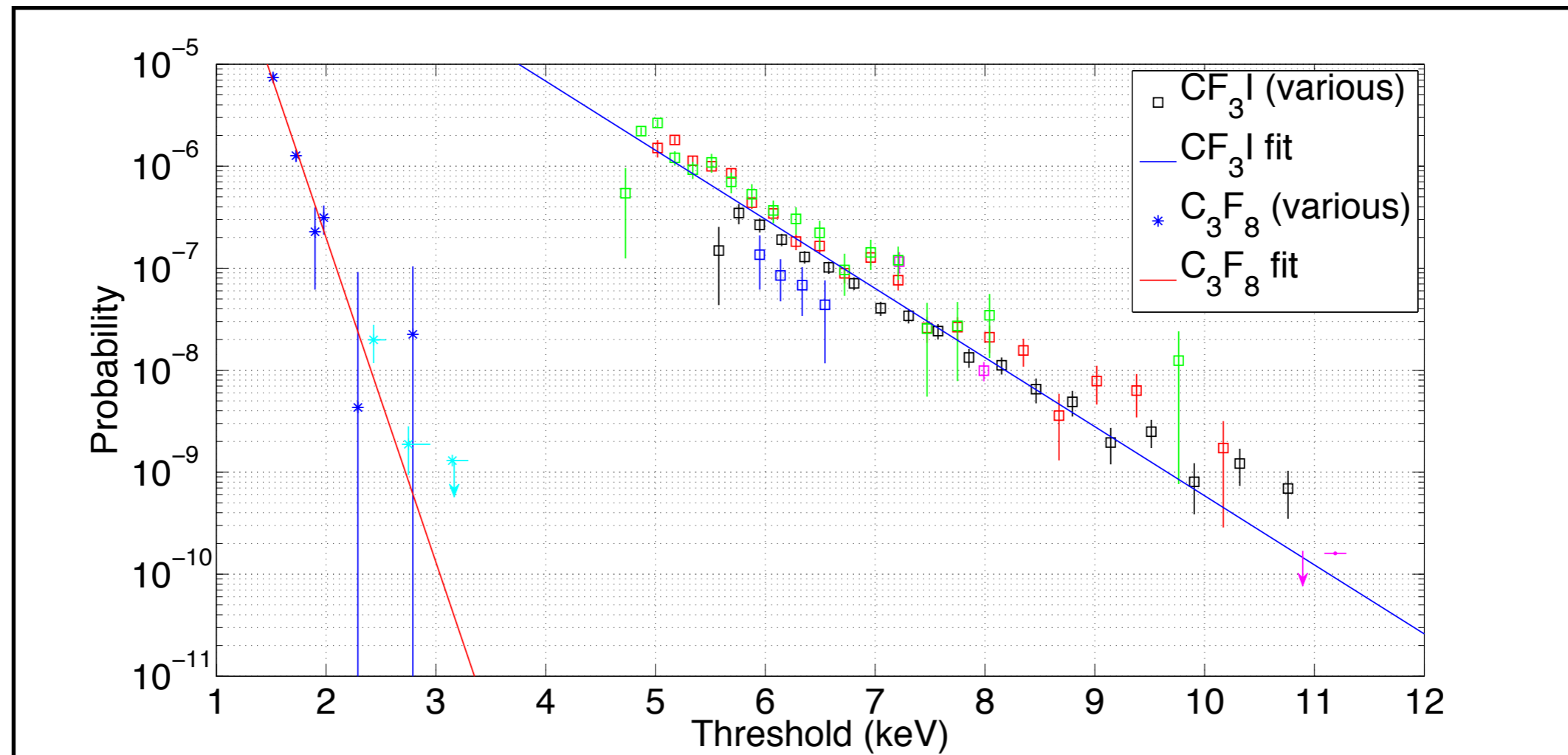
# PICO Family Tree



# Calibration activities

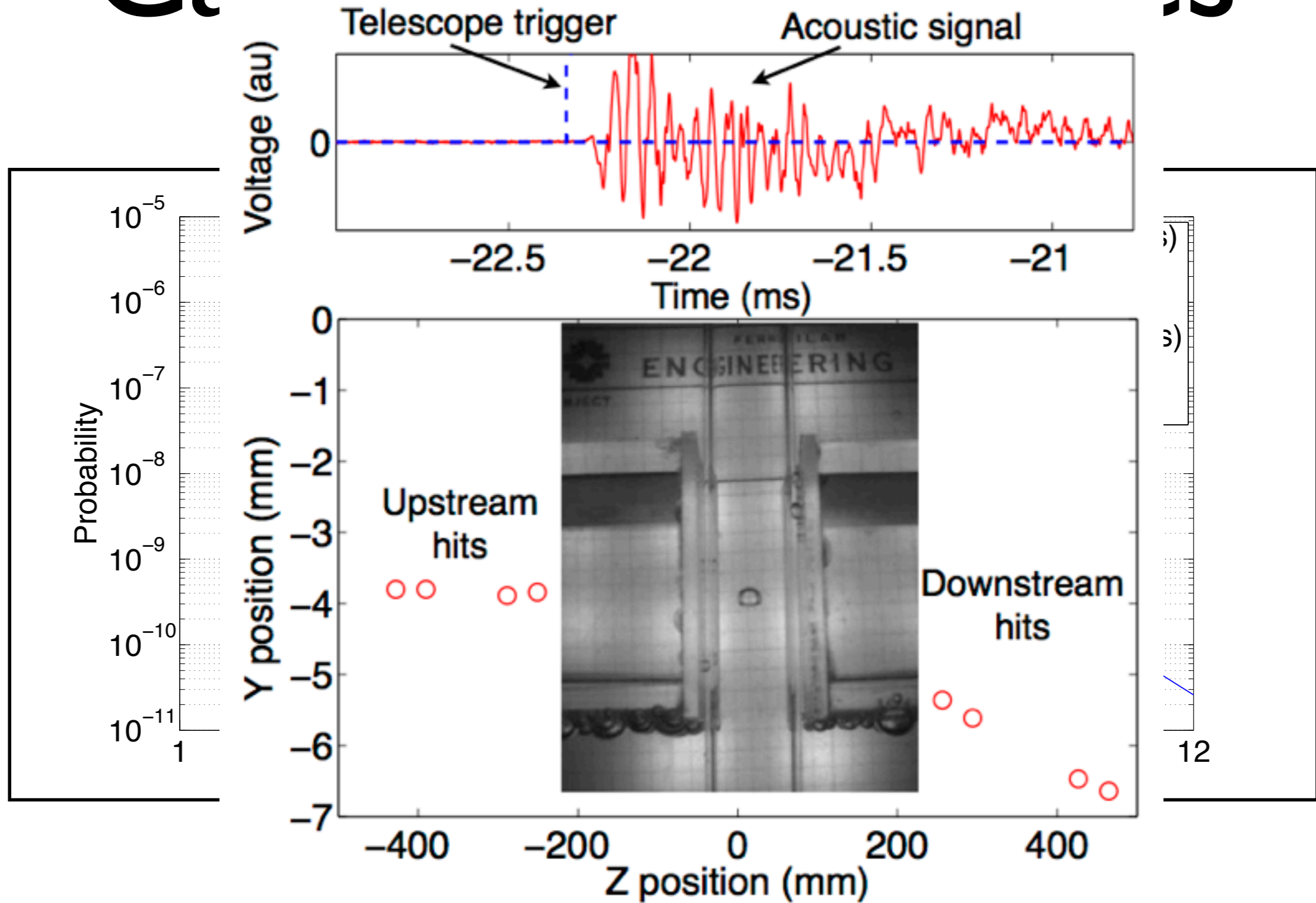
- Detailed measurements of threshold behaviour with mono-energetic neutron sources and test beam measurements.
- Montreal test beam is now used with a bubble chamber and  $C_3F_8$ , further improving the understanding of the bubble nucleations from nuclear recoils.

# Calibration activities



Gamma background suppression

# Calibration activities



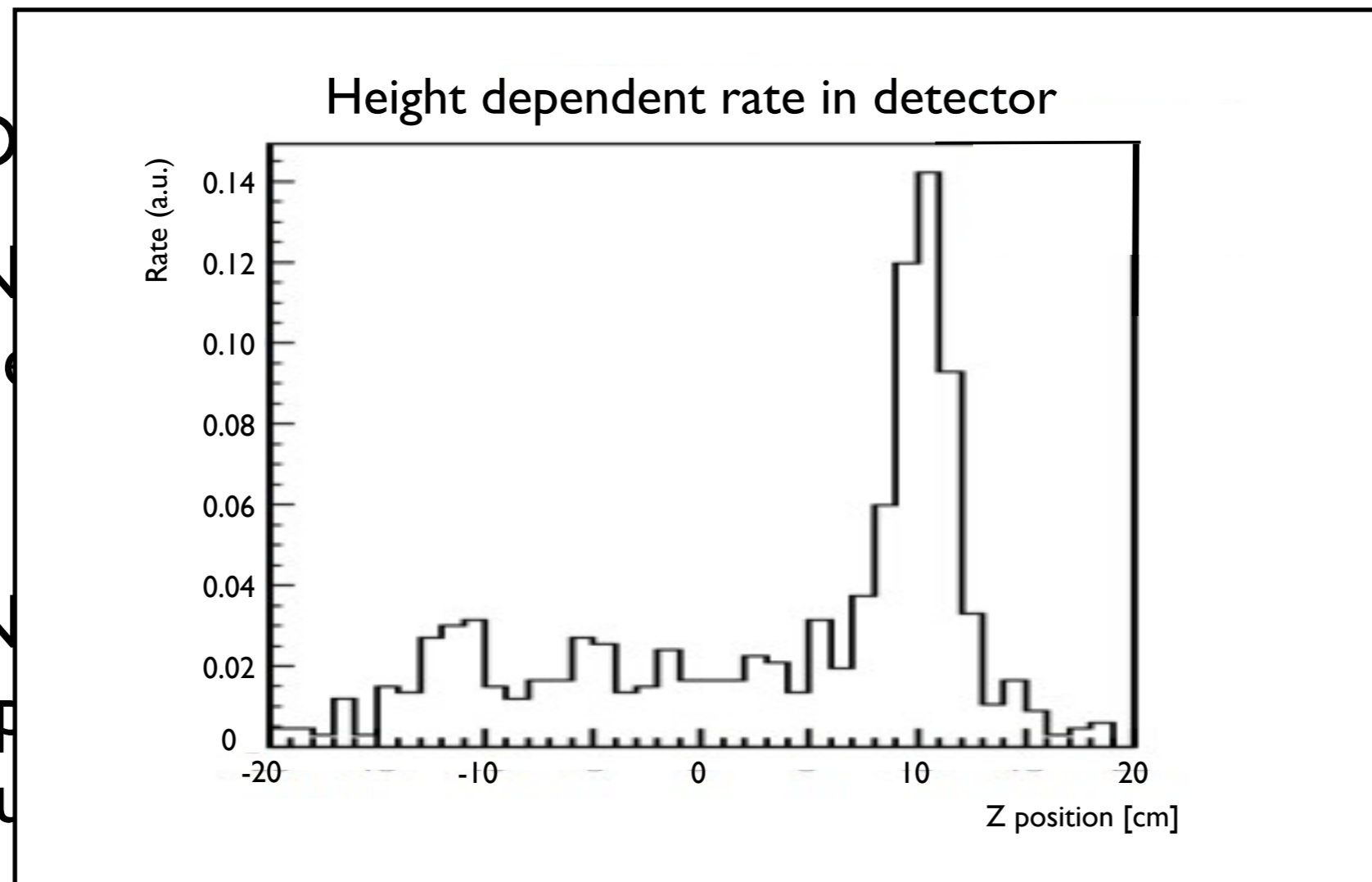
# PICASSO activities

- Data taking finished in Dec 2013
- New developments: 3d reconstruction within detectors now usable for analysis.
  - Allows to exclude hotspots, surface areas
- New wavelet analysis allows to reject events with spurious acoustics (that also happen to be from the surface).
- Analysis is 98% ready, expect final paper in short time.



# PICASSO activities

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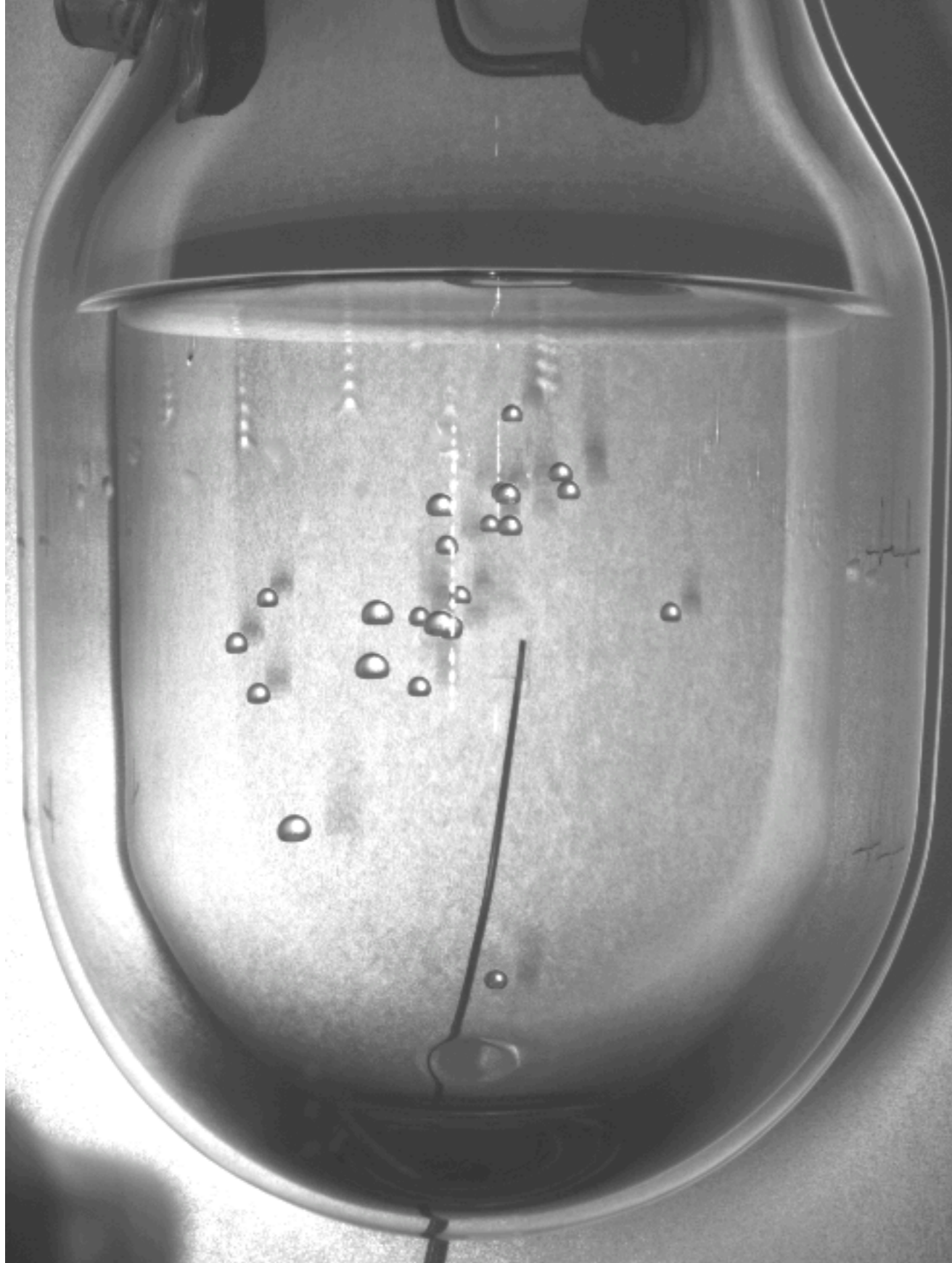
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# PICO 2L Activities

- First run successfully established that
  - $C_3F_8$  is a suitable liquid for bubble chambers. Threshold can be set as low as 3 keV. The sensitivity for recoil events is very high.
  - The acoustic discrimination works well in  $C_3F_8$ .



# Activities

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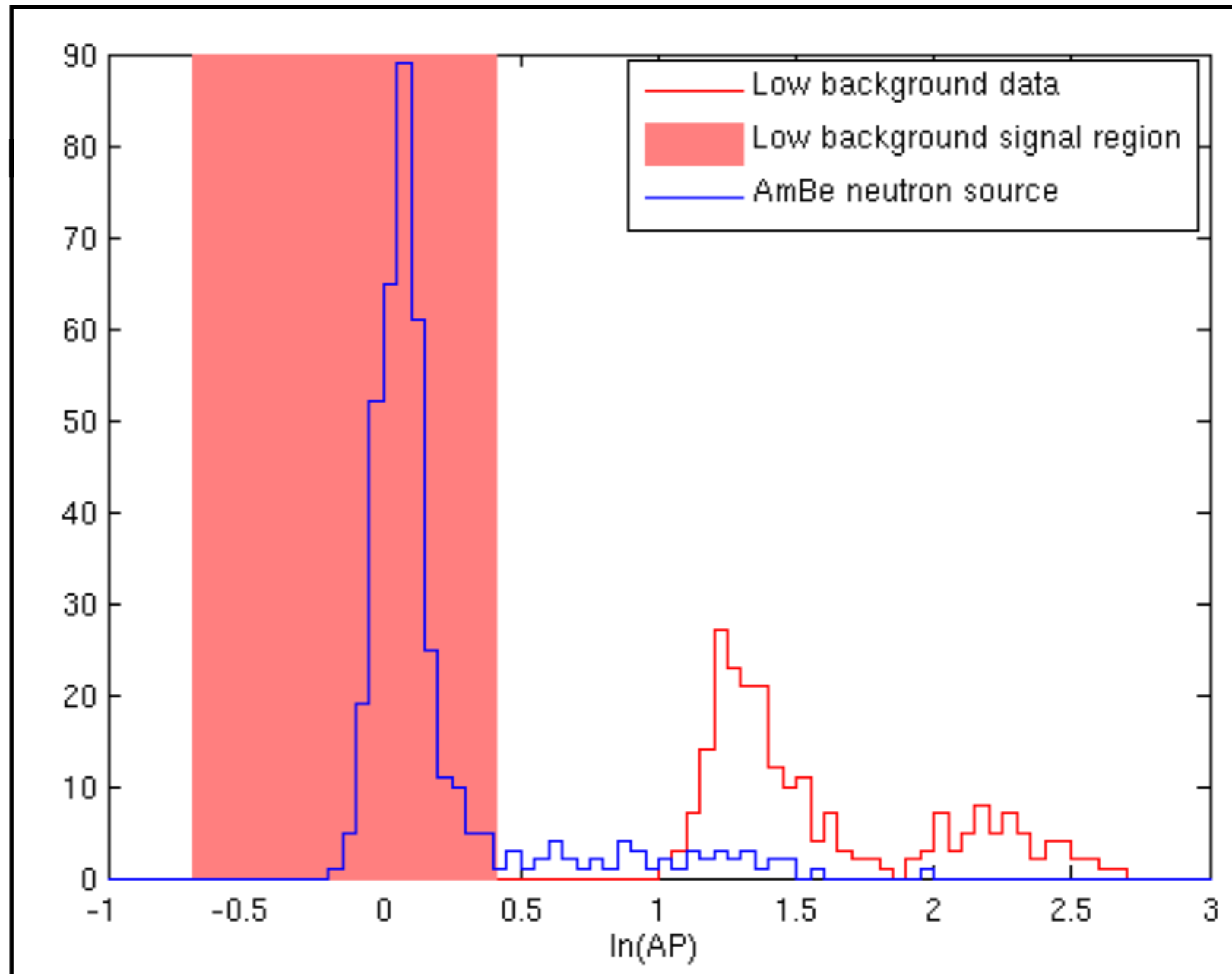
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# PICO 2L Activities

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# PICO 2L Status

- The chamber was contaminated in October 2013 during filling. Therefore some radon like events remained in the chamber as background, partially appearing as nuclear recoil events.
- The chamber will still produce very competitive results.
- Currently the system is being assayed and refurbished for a second run to exploit the full SD dark matter sensitivity.

# PICO

# OCUS

- The chamber was installed in October 2013 during the first phase of the project. Events remain partially above the noise floor.
- The chamber was refurbished in 2015 to improve the results.
- Currently, the chamber is being refurbished to improve the SD dark matter search.



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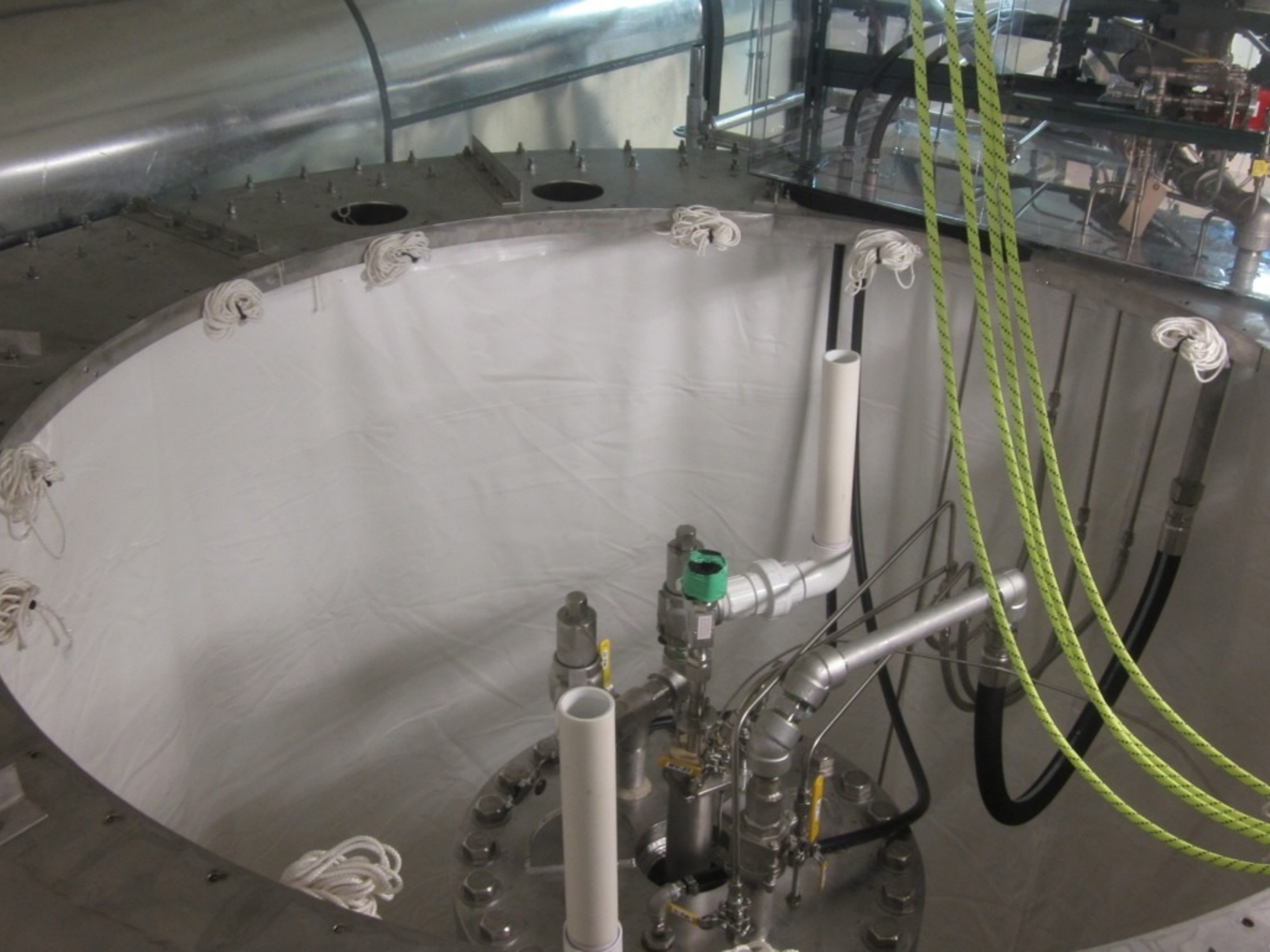
very competitive

played and exploit the full



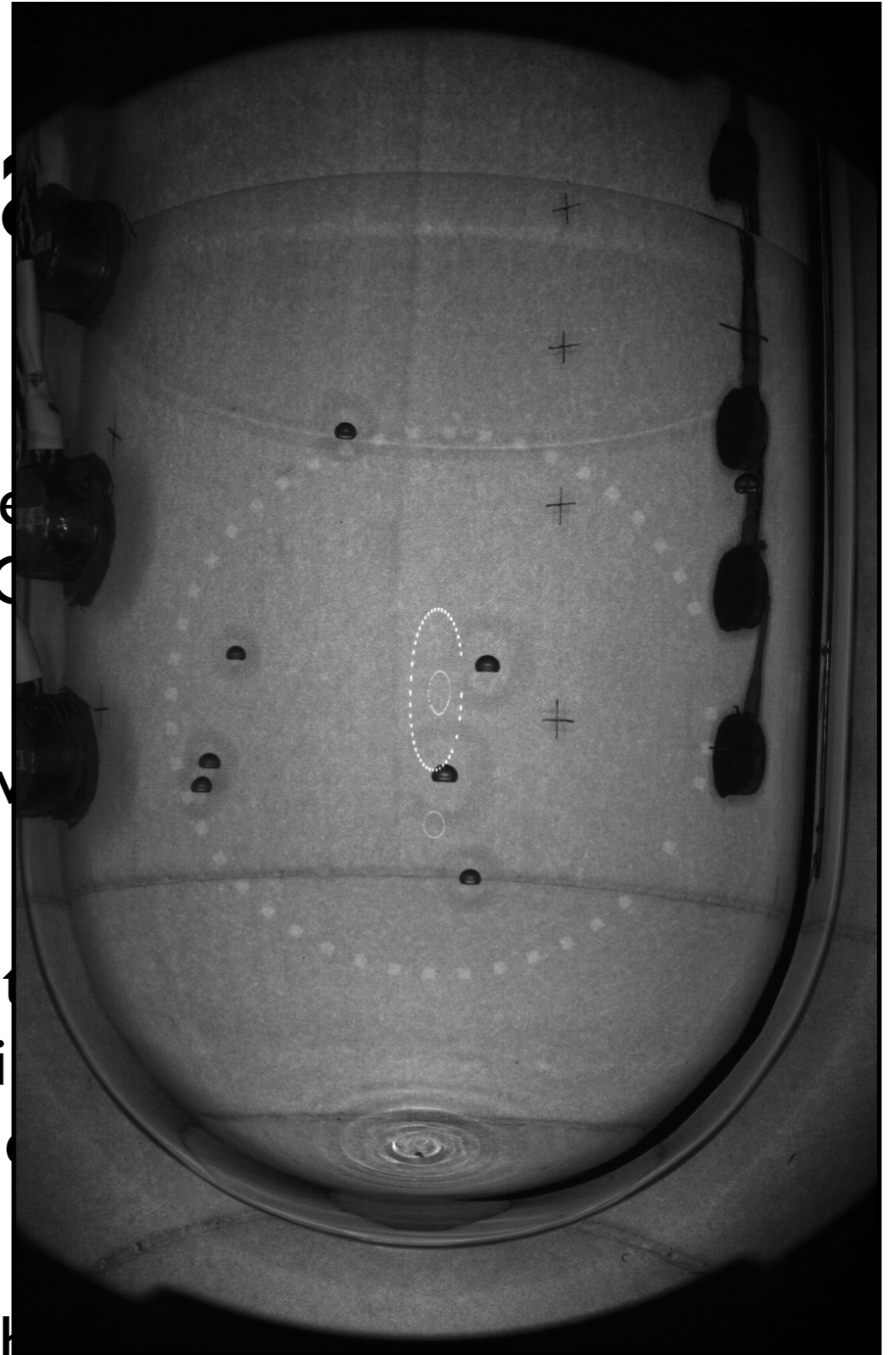
# COUPP 60 activities

- The experiment was put together and funded 100% by our US collaborators. Canadian PICO members will contribute to the data analysis and planned future operation with  $C_3F_8$ .
- The system operates very well, with good optical reconstruction and live time.
- The chamber has a background that is thought to originate from particulate matter containing uranium chain elements. We believe to have found the mechanism of contamination, but need to verify our suspicion by measurements.
- A second run is planned when the system is cleaned up.



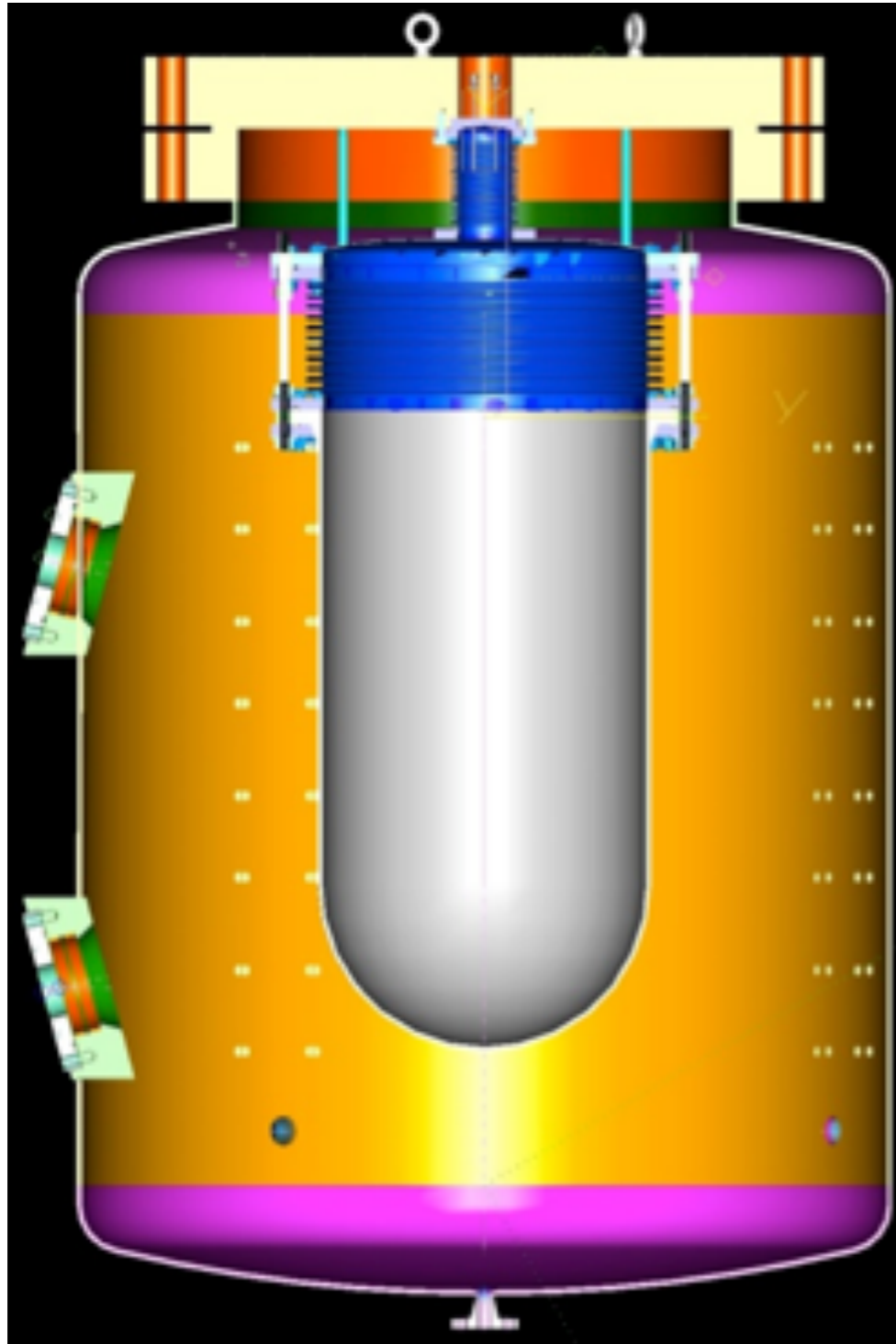
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- The chamber has a background from particulate matter containing We believe to have found the most but need to verify our suspicion
- A second run is planned when the system is cleaned up.



# PICO 250

- We plan to construct a 250 litre detector at SNOLAB in 2016/17.
- Design for system with the largest currently possible synthetic quartz vessel is progressing well.
- US funding decision is pending, CFI funding will be requested in this funding round.



# ○ 250

Construct a 250 litre detector  
2016/17.

Team with the largest  
The synthetic quartz vessel is

Construction is pending, CFI funding  
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# Presentations at CAP this week

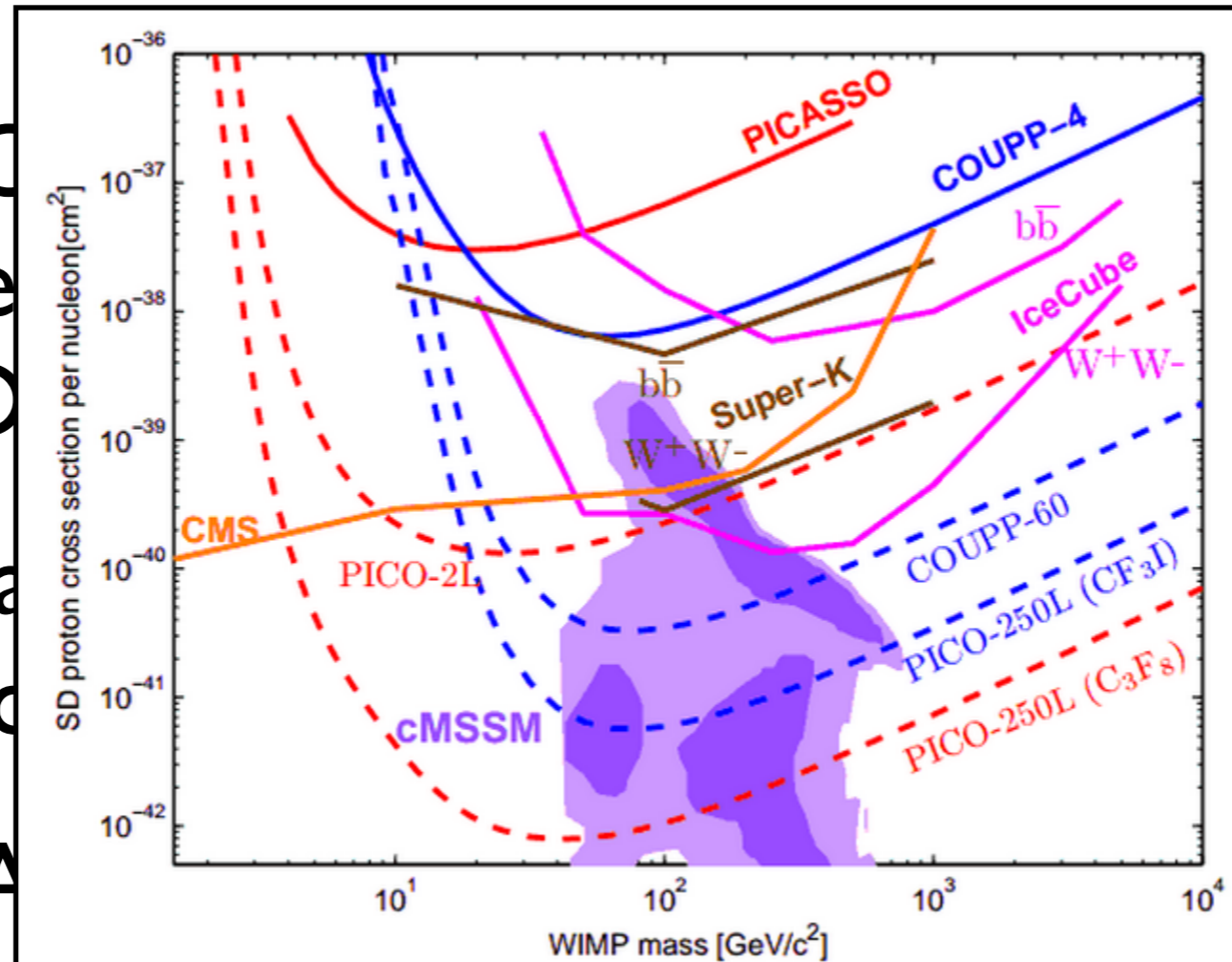
- Wednesday: PICO introduction (Alan Robinson, U Chicago), PICASSO status (Chris Jackson, UdeM)
- 2 Posters (Matthieu Lafrenière, Arthur Plante)
- 4 detailed talks: Mathieu Laurin, Chanpreet Amole, Ruslan Podvianuk, Pitam Mitra

# Summary

- PICO is a cutting edge dark matter search experiment with a great track record at SNOLAB.
- We are aiming to “own” the SD dark matter search sector in the foreseeable future.
- PICASSO has been an IPP project and PICO (containing all PICASSO members) will continue to be an IPP project.

# Summary

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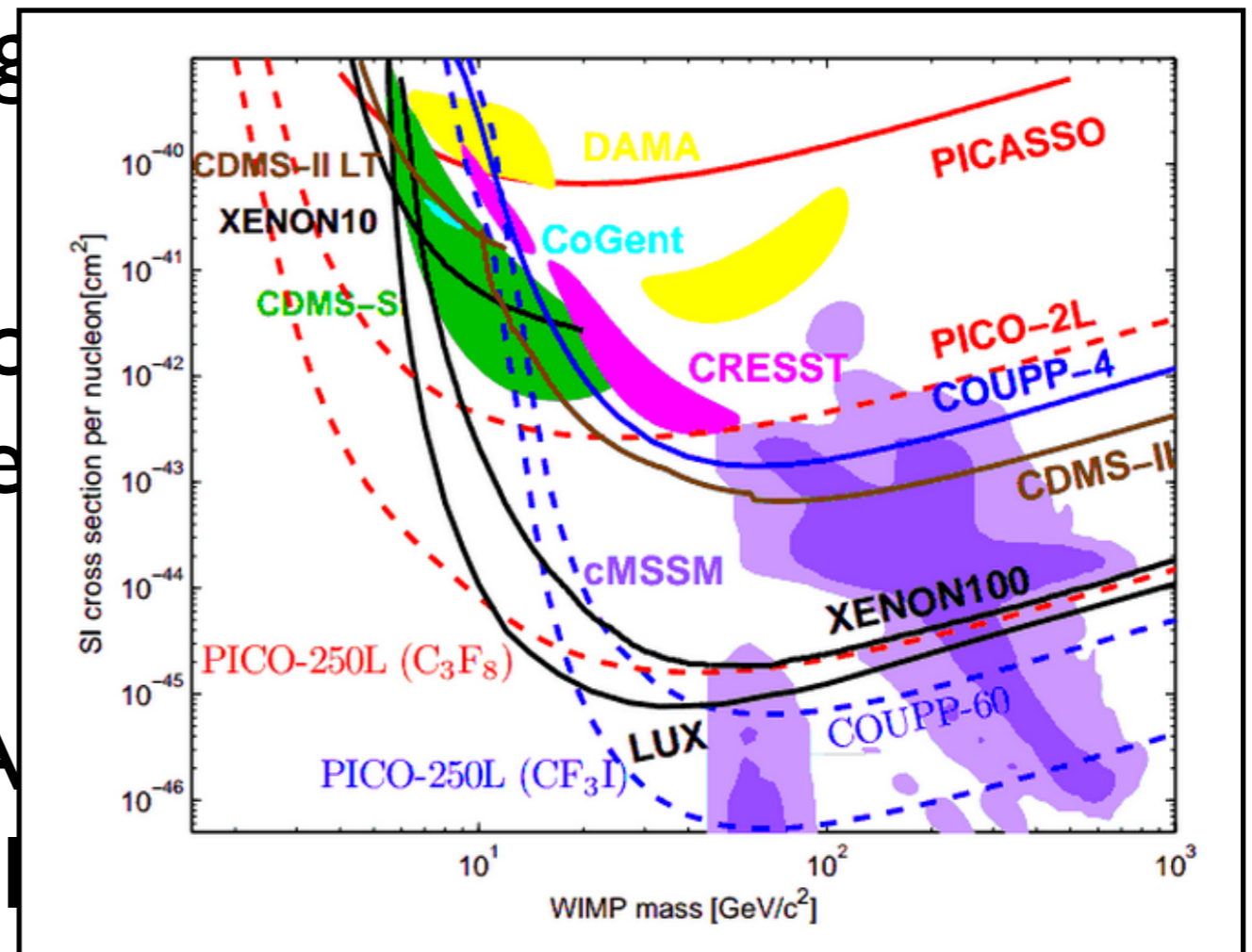


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**Thanks!**