Bologna NTD Group Status Report

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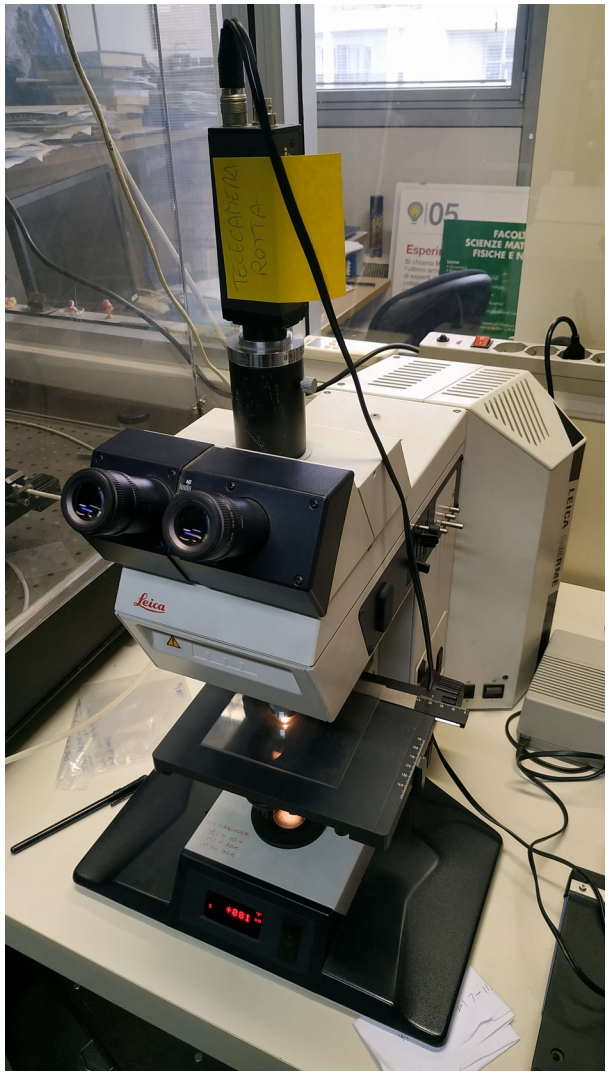
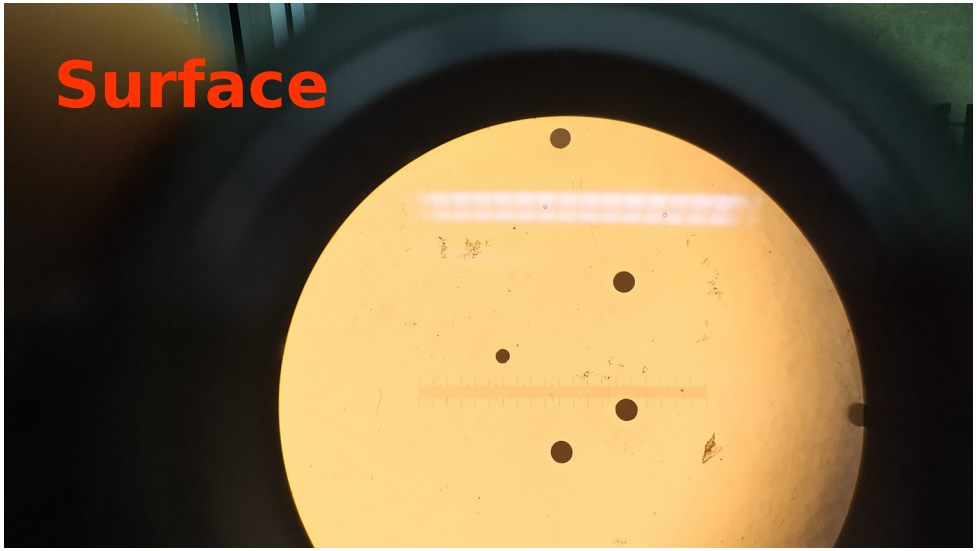
Date: 20 March 2020

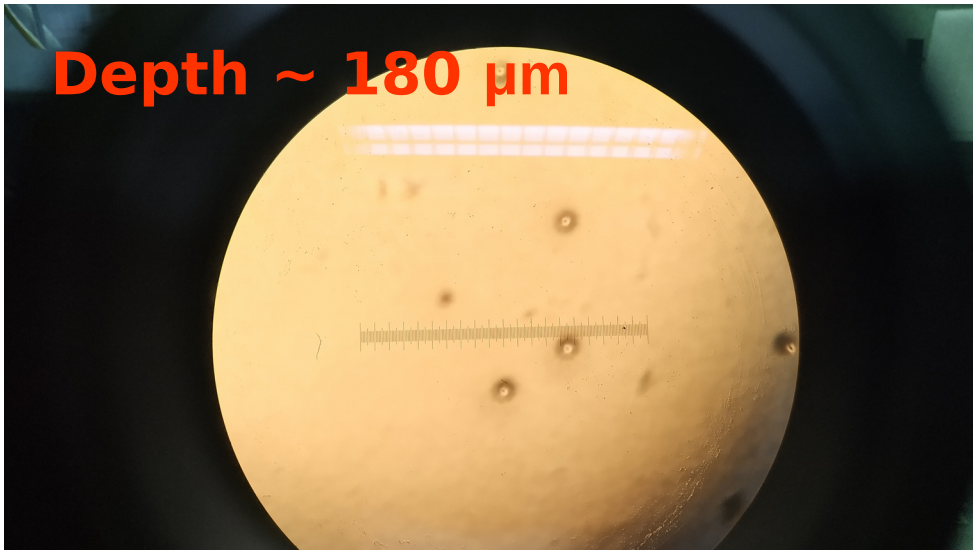
Makrofol Calibration and ‘Practical’ detection threshold: Current status

- Etching condition (new): 5.5 N KOH + 20% Ethyl alcohol at 45°C
- Track Parameters measured: Diameter(or area) and etch-pit depth. These two measurements are complementary. Diameter gives better resolution for lower Z (<75) fragments, while depth is better for High Z (>75). The goal is to combine data from the two sets of measurements to obtain one calibration curve.
- Parameters of over 5000 tracks have been measured manually (Leica, Jenatech)
- In addition automated measurements of the area of etch-pit openings of 10s of thousands of tracks were carried out, supplemented by manual measurement for Xe and smaller fragments for which automated measurement is difficult.
- Data analysis, cross checks and cross calibrations are in progress.

Manual measurement of etch-pit length with Leica DMRME microscope



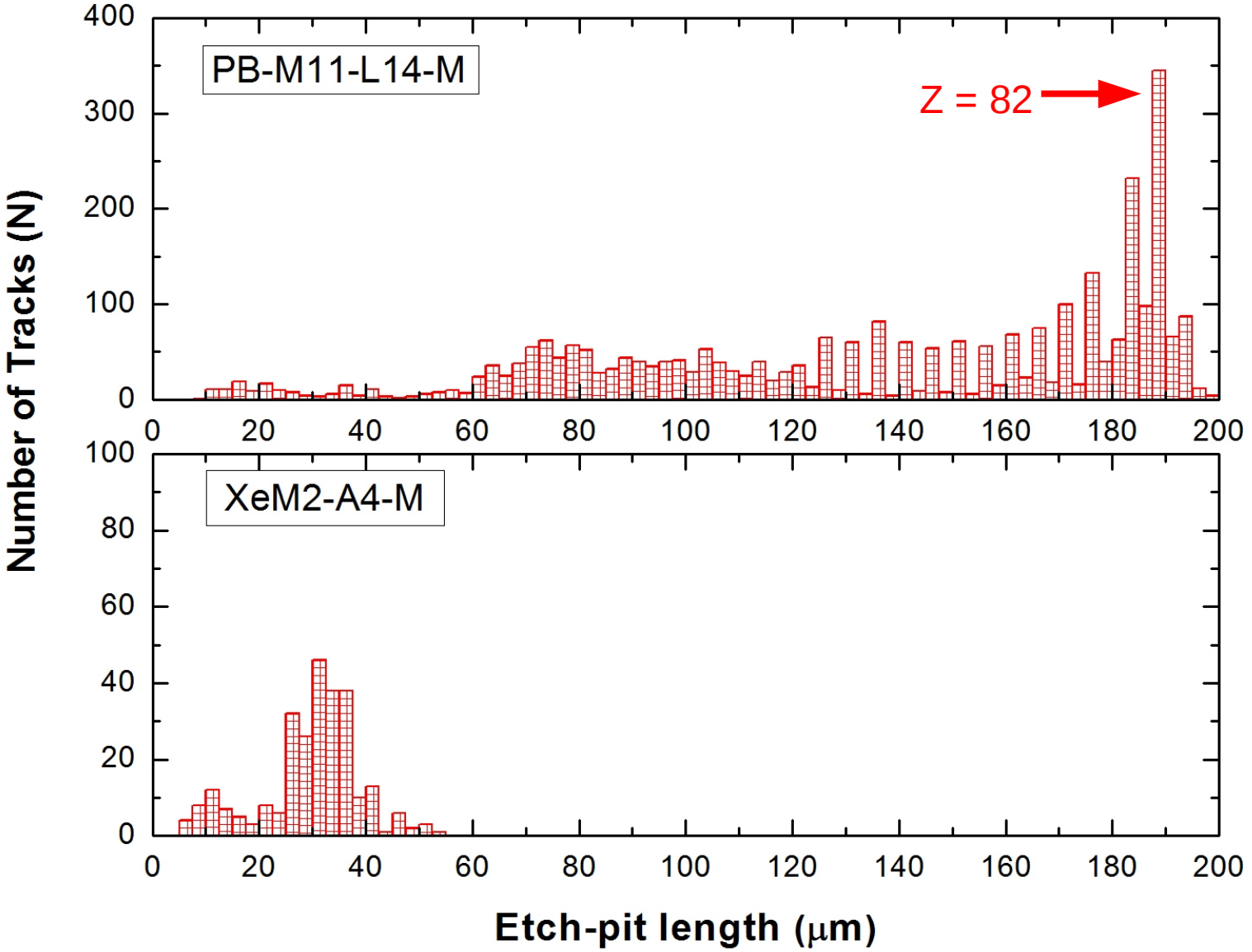




Calibration of Makrofol

Etch-pit length distribution of Pb fragments (preliminary)

Etchant: 5.5 N KOH + 20% Ethyl Alcohol at 45°C; Duration 7 h

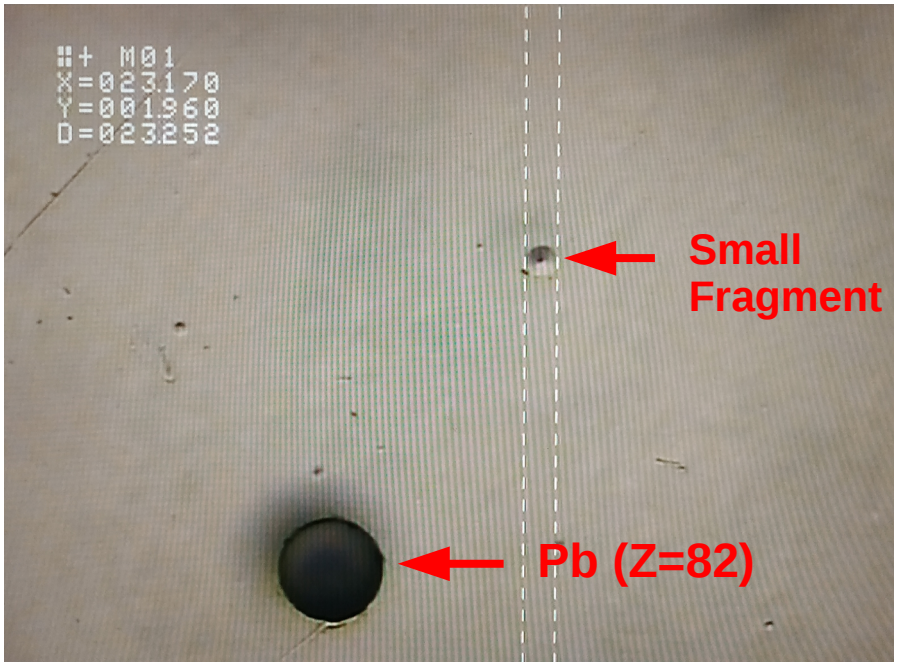


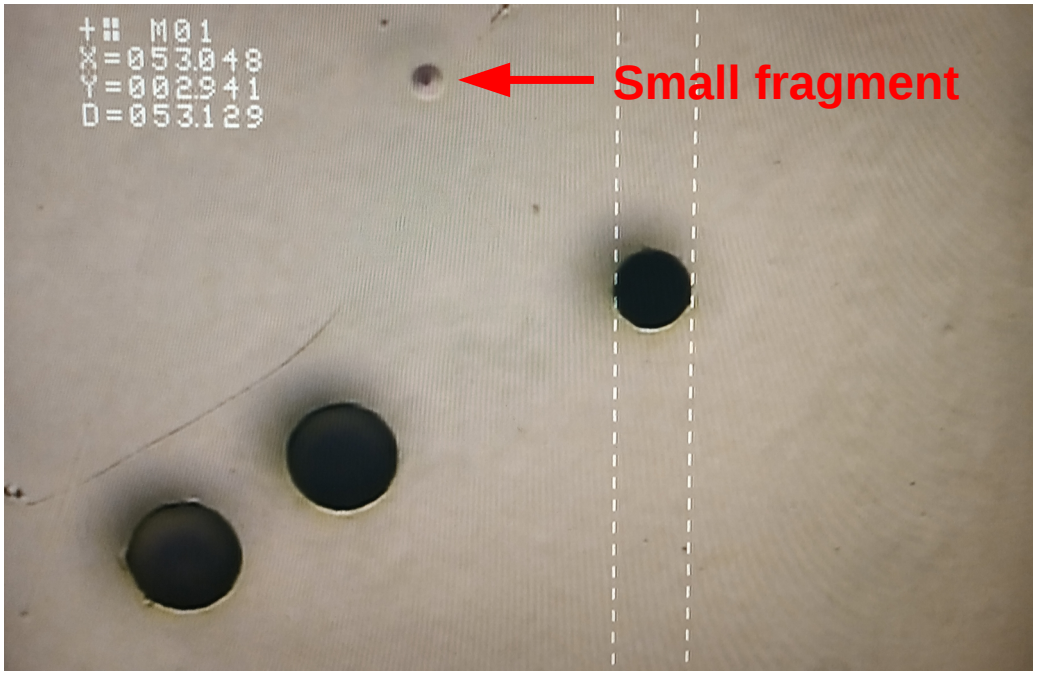
Determination of '**Practical**' Detection Threshold for Makrofol EXPOSED in MoEDAL

- The **charge of the smallest through going fragment** that can be visually identified against the MoEDAL background of other tracks is the 'practical' detection threshold.
- To find the practical detection threshold, first we need to obtain the diameter distribution of Pb and Xe fragments on Makrofol NOT exposed in MoEDAL.
- In the next step, the diameter distribution of Pb fragments on Makrofol previously EXPOSED in MoEDAL are to be plotted and the charge of the smallest fragments ascertained by comparison with distributions obtained in the previous step.
- We have to rely on diameter measurements for this purpose, as for Makrofol EXPOSED in MoEDAL, etch-pit lengths are difficult to obtain as tips of etch-cone are not propertly visible.

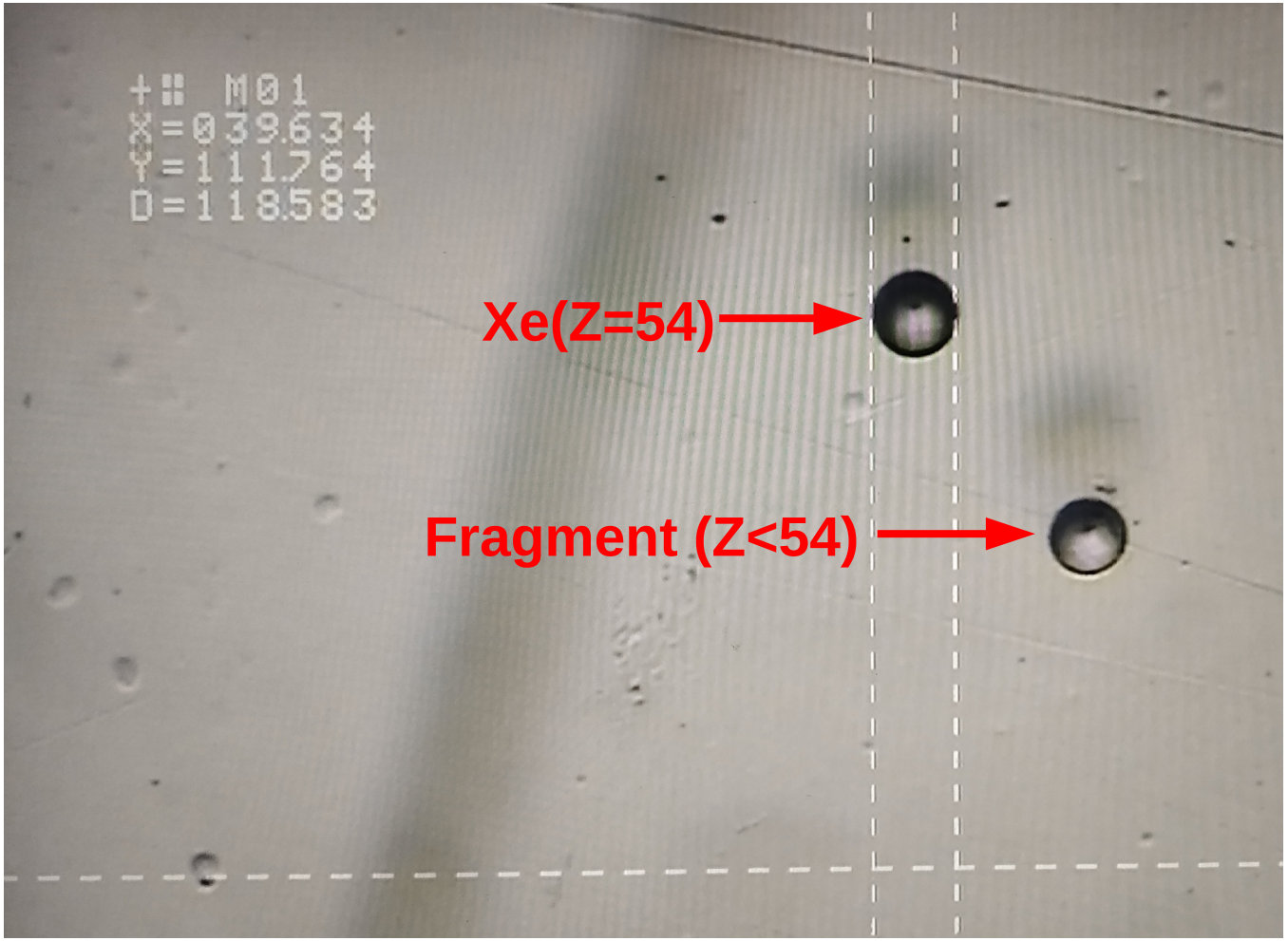
Pb and Fragments on Makrofol NOT exposed in MoEDAL

Microscope used : Jenatech, Total Magnification : 100x

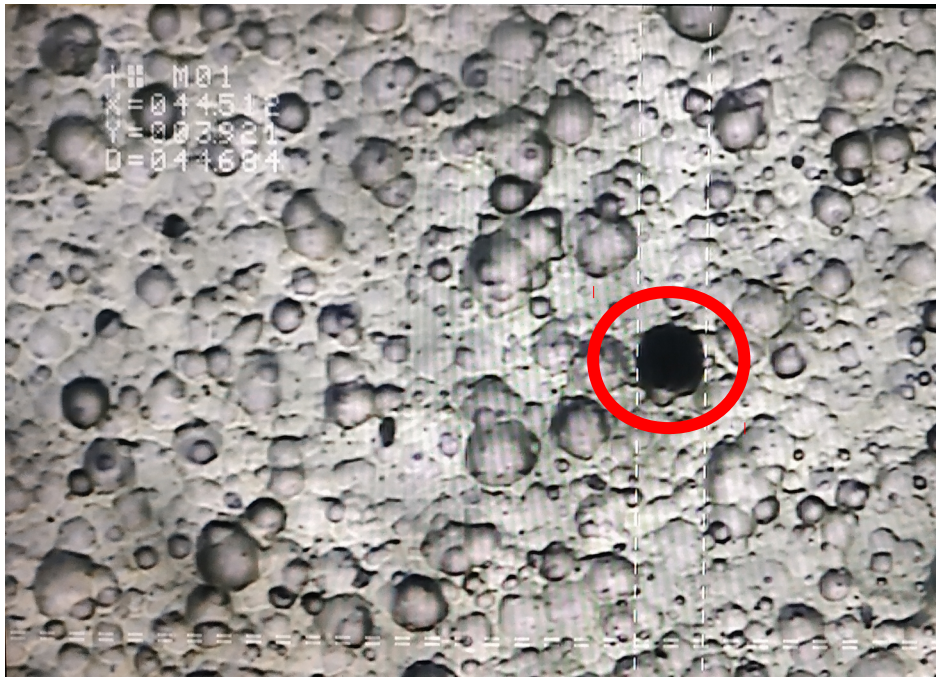


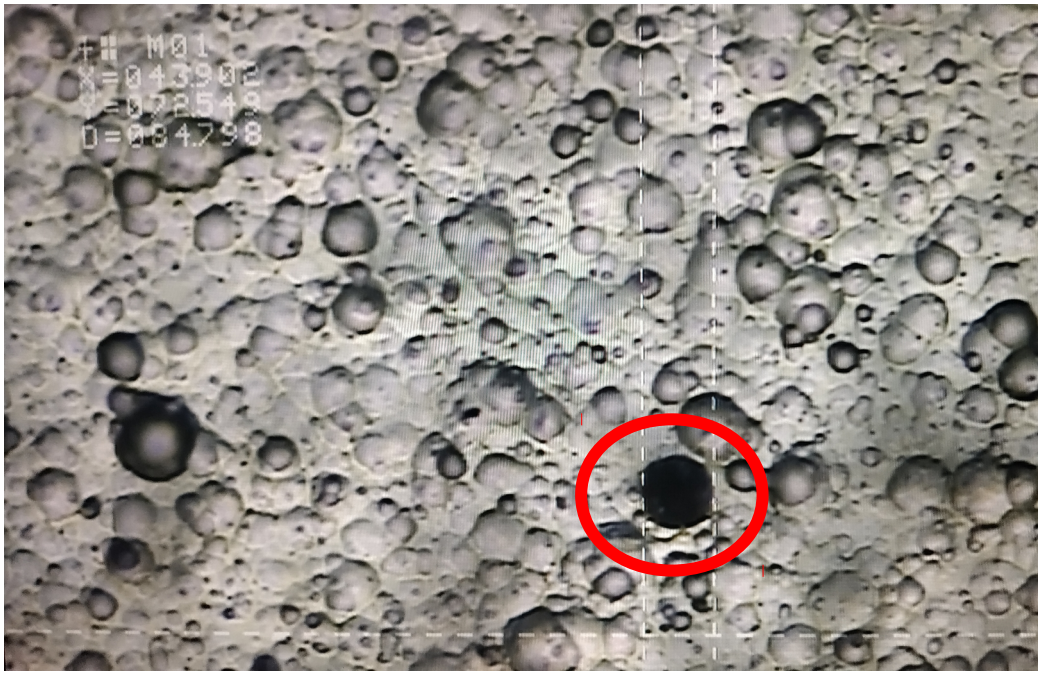


Xe and Fragments on Makrofol NOT exposed in MoEDAL



Smallest Pb fragments spotted (so far) on Makrofol EXPOSED in MoEDAL

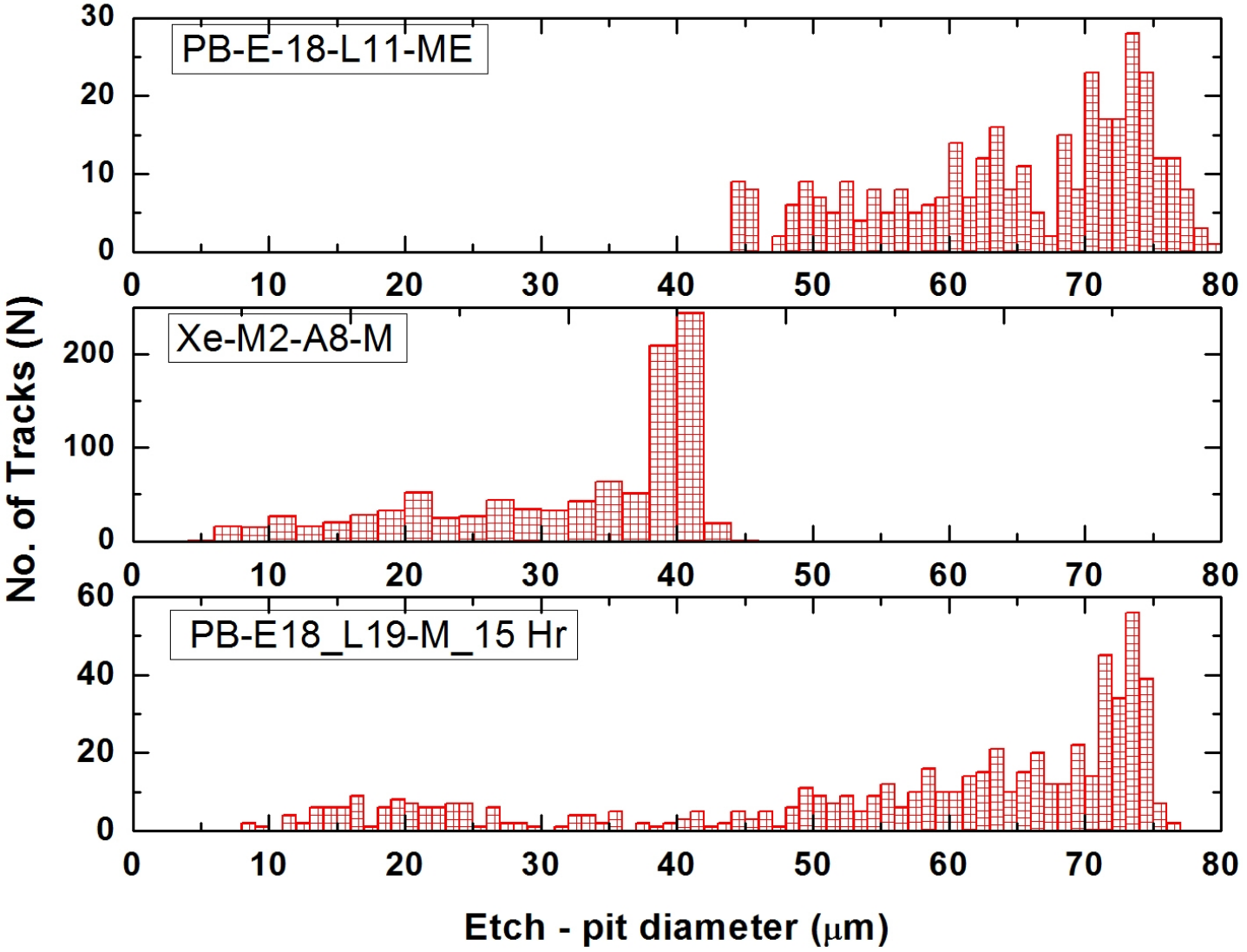




Etch-pit diameter distribution on Makrofol

(Preliminary results)

Etchant: 5.5 N KOH + 20% Ethyl Alcohol; Duration: 15 h



Conclusion and near term goals

- **Preliminary** investigations suggest that the smallest etch-pits corresponding to through going fragments that can be spotted on Makrofol EXPOSED in MoEDAL have diameters **slightly bigger** than that of Xe tracks
- This gives a hint that ‘practical’ detection threshold is somewhat higher than 54
- A definitive value of the practical detection threshold can be given once the base area spectrum is obtained.
- Scanning of the MoEDAL exposed Makrofol restarted. Goal is to complete the scanning of remaining area (~4 sq.m.) from the 2014-15 exposure within the next few months.