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Update on the post-irradiation examinations on high Z materials from HRMT-27 and HRMT-42 experiments

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In the framework of the Extra Low Energy Antiproton Ring (ELENA) project, a new upgrade of the CERN AD facility is planned, including the replacement of the actual AD-target. Dynamic stresses take place in target materials as a consequence of the sudden increase of temperature after each pulse, leading to their potential failure. In this context, the two HRMT-27 and HRMT-42 experiments have been conducted to study these effects, for future target material candidates.

HRMT-27 experiment aimed at impacting 440 GeV proton beams onto thin rods (8 mm diameter –140 mm length) of high-Z materials such as Ir, W, Ta and Mo among others, with the objective of reaching equivalent conditions of temperature and dynamic stresses to those found in the AD-target. All materials expect from Ta suffered from internal damage hence it was considered as next candidate material for the AD-Target. A further step within the R&D activities was achieved with the HRMT-42 experiment. A first scaled target prototype, constituted of a sliced core made of ten Ta rods -8 mm diameter, 16 mm length- embedded in a compressed expanded graphite (EG) matrix was tested with the same beam parameters.

Extensive post irradiation examination is on-going for all the materials from HRMT-27 and HRMT-42. It comprises non-destructive examinations (ultrasonic testing and neutron tomography), specimen preparation and destructive examinations (microstructural analysis and miniaturized mechanical testing). In a first place, a general overview of the different steps from the extraction of the rods to the on-going examinations will be given. In a second place, an insight will be dedicated to the first results of the microstructural analysis by means of optical and electron microscopy.

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