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Capabilities of testing detectors for high energy physics by MeV energy ions

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By shrinking the sizes of detectors used in high energy physics experimental setups, techniques that can characterise detectors at the micrometer size levels are getting more and more attention. This may be one of the reasons why the Ruđer Bošković Institute (RBI) and its microprobe based IBIC (ion beam induced charge) system, attracted more than 20 users from the high energy physics community during the course of the AIDA2020 project. Several important developments and improvements, initiated by users, have been in the meantime accomplished and as such the IBIC setup is now much more suitable for testing of different detectors, from simple basic structures to complex monolithic prototypes and devices.

In this presentation we will show the main characteristics of the present setup for IBIC and ion beam induced TCT, that are an integral part of the ion microprobe end station. Ion beams of the MeV energy range (0.1 to 25 MeV, depending on the ion mass), with respective ranges in silicon between 1 and 500 um, are provided by one of the two electrostatic accelerators (1.0 and 6.0 MV tandems). Experiments are generally performed in vacuum chamber. However new in-air setup can be used for larger detector structures, which can be exposed to proton beams with still small enough spot sizes (3-10 um). Several characteristic applications of the system within the AIDA2020 will be presented together with a foresight to new future projects that may be beneficial to high energy physics community.

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