SINGLE PROTON HIT FACILITY AT THE IFJ PAN IN CRACOW

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This work presents the final development stage of the single proton hit facility in Cracow. We show rearrangements in our microprobe system and the final design of dedicated chamber for out–of–vacuum cells irradiation. As a bombarding beam we use 2 MeV protons delivered by the IFJ Van de Graaff accelerator. The achieved external hit resolution of about 10 μm is sufficient to target a single cell. During irradiation, the intensity of the proton beam, bombarding the biological sample, is reduced to a value of about 1000 p/s. The silicon detector placed in the direction of the beam outside the vacuum permits to register 100% of protons entering the atmosphere. The fast beam blanking system based on information from the particle detector allows hitting the cell with certain number of protons with 99.8% accuracy.

The dish with cells during experiment is mounted at the 3D precise moving table (0.1 μm accuracy) and observed via microscope. To eventually target the particular cell on especially prepared Petri dish we use a semiautomatic cell visualisation and recognition system tailored to our setup. This work presents the current status of the setup as well as the results of optimisation studies and performance measurements of the facility.

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