

MODELLING STUDY OF NUCLEAR REACTOR STRUCTURAL MATERIALS RADIATION DAMAGES BY USING ION BEAMS*

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Ion accelerator facility is a powerful tool to simulate neutron irradiation effects in reactor materials. At the NRC “Kurchatov Institute” - ITEP the heavy-ion accelerator HIPr (heavy ion prototype) is used for the of radiation damage simulation in steels and alloys by ion beams [1-4]. Irradiations are carried out mainly with iron ions Fe²⁺ (5.6 MeV), but if necessary, beams of vanadium, tantalum, carbon and many other ions can be used. Irradiated specimens are investigated by atomic probe tomography and transmission electron microscopy (TEM). Helium and hydrogen ion beam implantation in heavy ion damaged area can be used to simulate transmutation effects occur in reactor materials [5]. This will allow modeling such an important process as radiation swelling of the material under the neutron radiation impact. Now work is underway to build a second beam line of the HIPr facility (see fig.1) for simultaneous sample irradiation by heavy ion and hydrogen/helium ion beams [6]. The descriptions of beam simulation experiments at ITEP on the HIPr facility and the on-going project of the second beam line for hydrogen/helium ion beams are reported.

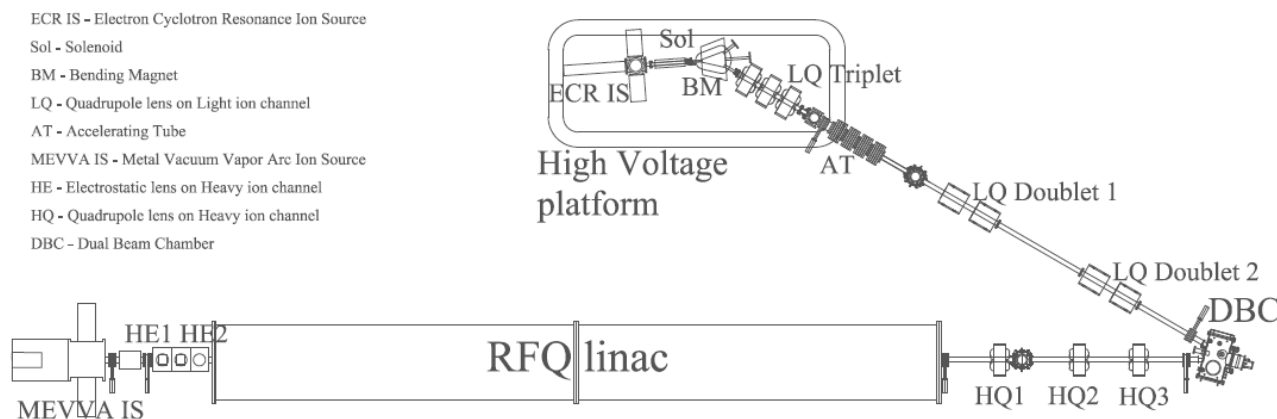


Fig.1. Layout of HIPr facility with designed second beam line of light ions.

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