



Contribution ID: 5

Type: not specified

## Measurement of displacement cross section for high-energy protons and future plan for material damage using 400 MeV protons at J-PARC

*Wednesday, 28 June 2023 11:20 (30 minutes)*

The material damage index of displacement per atom (dpa) is obtained by the particle flux and the displacement cross section. However, the experimental data of the displacement cross section was scarce. The measurements using proton beams were conducted, and so far, the experimental data of protons up to 30 GeV have been obtained in J-PARC and other Japanese facilities. The displacement cross section was almost constant regardless of the projectile proton energy above several GeV, which is against the expectation because the heat deposition given by the proton increases as projectile energy due to the relativistic theory. The experiment with 120 GeV protons at Fermi National Laboratory (FNAL) was conducted to obtain the data for high-energy regions. In this talk, the experimental data will be presented. To extend the energy region, the experiment with 430-GeV protons at HiRadMat in CERN is planned for the following year.

Additionally, a new beam irradiation facility plan at J-PARC with 400-MeV protons to study material radiation damage will be presented in this talk. In 2022, the user community of the facility was established. New users, especially those outside of Japan, will be welcomed.

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**Session Classification:** Talks