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RaDIATE thermal shock experiments at CERN's HiRadMat facility

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With increasing beam intensities of future accelerator facilities, it is critical to understand the thermal shock response of conventional and novel materials used as accelerator beam windows and secondary particle production targets in order to successfully design and operate these components. As a result, experiments initiated by the RaDIATE collaboration, have been carried out and are being designed at CERN's HiRadMat facility where single-shot high intensity proton beams probe and investigate the thermal shock response and limit of relevant materials. The BeGrid (HRMT24) experiment, composed of various grades of beryllium specimens and exposed to varying beam intensities, was successfully executed in 2015. Results from the BeGrid Post-Irradiation-Examination (PIE) work and numerical simulation benchmarking efforts will be presented in this talk. In addition, an update on the upcoming BeGrid2 (HRMT43) experiment will be provided. The BeGrid2 experiment will be carried out later this year and will comprise of conventional accelerator materials as well as novel electro-spun nano-fiber materials. The difference in thermal shock response of non-irradiated and previously irradiated specimens will be investigated, as well as real-time measurements of beam-induced dynamic stresses.

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