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E-POSTER VIEWING - RADIATION MODALITIES & NEW HORIZONS

FACILITY OVERVIEWS; HOW FLASH RT IS DELIVERED: ELECTRONS, PHOTONS, PROTONS, HEAVY IONS: EQUIPMENT INVOLVED, HOW BEAM IS DELIVERED, EXPERIMENTAL END STATIONS ETC?

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ON THE DEVELOPMENT OF THE “PITZ-ROBOT” FOR USE AT THE FLASHLAB@PITZ EXPERIMENTAL AREA

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Background and Aims: The 22 MeV PITZ accelerator at DESY-Zeuthen is well-suited for FLASH-RT research, a novel cancer treatment technique, due to its wide parameter range. Adjustable factors such as the number of RF pulses, micropulses, micro pulse charge, RF repetition rate, and beam size allow for dose rates from 0.05 Gy/s to 10⁷ Gy/s. The full FLASHlab@PITZ beamline, currently under installation, includes a second dipole, quadrupoles, vertical and horizontal kickers, and advanced diagnostics. The PITZ-Robot, a customized version of the CLEAR-Robot (C-Robot), is part of the upgrade package. This work reports the development of the “PITZ-Robot”.

Methods: Building on the lessons learned from commissioning the C-Robot in the FLASHlab@PITZ startup beamline, the PITZ-Robot has been designed and developed to provide precise positioning for sample irradiation, achieving 50 µm accuracy across three axes. A custom-designed 3D-printed holder, equipped with a YAG screen and a 45° mirror, serves as a beam tracker and provides real-time positioning feedback with the CCD camera attached to the robotic arm. Additionally, the original MATLAB script has been adapted to allow for fine-tuning of the irradiation positioning.

Results: Hardware design and software updates enhanced beam positioning accuracy at FLASHlab@PITZ. The PITZ-Robot has been installed on the new beamline, and its commissioning is ongoing to ensure consistent beam alignment and reliable dosimetry, crucial for experiments on the FLASH effect in radiation therapy.