# AbstractID: 12578 Title: Laser-based particle acceleration for future ion therapy: Current status of the joint project onCOOPtics with special focus on beam delivery and dosimetry

**Purpose:** Before the novel technology of laser-based particle acceleration can be used for clinical applications, several requirements have to be fulfilled. These are the supply of stable and reliable particle beams with reproducible properties, sufficient particle intensity and useable energy spectra. Additionally, a precise dose delivery in an appropriate time and the exposure of a desired irradiation field are needed. Beside these demands, consequences on dosimetry as well as on the radiobiological effect have to be investigated for ultra-short pulsed laser-accelerated particle beams. **Method and Materials:** The joint project onCOOPtics, an interdisciplinary and multicenter institution focusing on the development of a laser particle accelerator for radiation oncology, is introduced. The worldwide first systematic *in vitro* irradiations with laser-accelerated electrons performed with the JeTi laser system will be presented focusing on the experimental setup, practical experiences and on dosimetric and radiobiological results. In a next step, cell irradiation experiments with laser-accelerated protons have been prepared. Therefore, a dedicated dosimetric system was developed. It is integrated into a device that can be installed at different laser and conventional accelerators and serves also as cell or animal irradiation device. **Results:** A laser accelerator was successfully optimized for systematic radiobiological experiments performed over 3 months. No significant differences between laser-accelerated and conventional 6 M*e*V electron beams were found. An integrated dosimetry and cell irradiation device for systematic *in vitro* and *in vivo* experiments with laser-accelerated protons was developed, characterized, calibrated and successfully tested with both continuous and pulsed proton beams. Cell irradiations with protons have been started. **Conclusion:** Laser accelerators can be used for radiobiological experiments, meeting all necessary requirements like homogeneity, stability and precise dose delivery. Nevertheless, before fulfilling the much higher requirements for clinical application, several improvements concerning i.e. proton energy, spectral shaping and patient safety are necessary. Supported by BMBF (03ZIK445).