

Towards clinical imaging and radiotherapy of human patients

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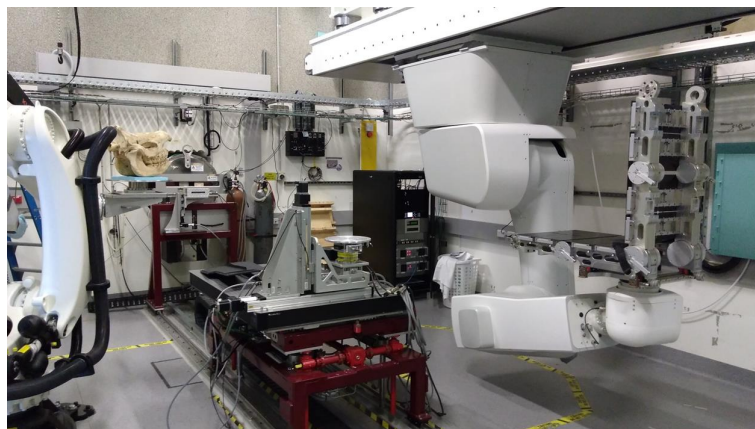
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Since June 2015 and the milestones associated with 13.2 M of phase II funding we have given our users unrivaled facilities for research using imaging, CT and radiotherapy. This is especially true for *in vivo* research where the IMBL leads the field of large animal imaging by combining the ‘large animal positioning system’ (LAPS) with an extensive experiment support infrastructure and veterinarian expertise on our staff. As the demand for beamtime grows, we can now concentrate on our next big programmes: canine radiotherapy and clinical imaging of human patients.

The canine programme will validate the treatment planning, dosimetry, image guided dose delivery chain with broad beam irradiation of patients supplied by veterinarians. When this chain will be reliably established we will move to micro-beam radiotherapy treatments to quantify the response of spontaneous tumours to micro-beams and gather long term toxicology data. This programme is a critical step towards human patients.

For clinical imaging of humans we have installed and ‘cold’ commissioned a ‘patient positioning system’ (PPS). The PPS is a 6-axis robot mounted on an 8 m linear translation. It is able to position any part of a human body anywhere along the beam path with a mechanical repeatability of 0.1 mm. Our first clinical project with humans is phase contrast breast CT. This programme is scheduled for validation with human patients in 2020. It includes the addition of beam expander to deliver a 10 cm high 20 cm wide beam to the satellite building bunker at 140 m. Once combined with a matching high efficiency area detector, we will offer low dose imaging of clinically relevant samples to our clinicians and medical researcher community.

This paper will present the science cases, the new optics, the current beamline and detector developments as well as the safety systems for imaging and radiotherapy.



The IMBL imaging bunker with the LAPS, small sample CT setup and Patient Positioning System