

## An update of the PRaVDA – iThemba LABS (iTL) collaboration (November 2016)

In November 2012, Pravda (Proton Radiotherapy Verification and Dosimetry Applications) came to South Africa iTL with two large area CMOS (Complementary Metal Oxide Semiconductor) sensors and demonstrated that they could detect individual clinical-energy protons and that they were able to track them across two sensors. Then Pravda was awarded a translation grant by the Wellcome Trust (R32m) for a totally novel instrument – an instrument that would produce clinical-quality proton computer tomography (CT) imagery, perform Quality Assurance (QA) dosimetry and do in-treatment monitoring. New sensors and specialized novel integrated circuits were designed and fabricated. They developed probably the most complex Monte Carlo simulation of a proton therapy delivery system with detailed modelling of the detector system. For this work Pravda was awarded the Institution of Engineering and Technology Innovation Prize for Model-based Engineering in the UK.

In May 2016, Pravda managed to obtain the first relative stopping power proton CT – not bad as the Americans took nearly 20 years to get to this point. Also they demonstrated the first CT based on scattering power alone. This new modality means the overall instrument is much simplified.

In the past two weekends, a Pravda 7-person team and personnel from the Medical Radiation Department at iThemba LABS collected over 8 TBytes of data. The team successfully obtained proton CTs for a biological phantom together with a novel phantom that will prove beyond doubt the ability to reduce range errors in Proton Therapy through proton imaging.

Pravda has four published world patents and a further UK application. There have also been numerous papers published, including one appearing in such premier journals as “Medical Physics”.

Pravda is now seeking further support as we wish to see our technology in clinical use and helping cancer patients across the world.

It has been incredibly beneficial to the Pravda project to have access to a facility such as iThemba – despite the distances involved. It is a wish that Pravda-iTL can work together again in the future and that iTL is able to maintain the availability of such proton beams. The advantages and power of charged particle imaging is beginning to emerge– it will become a significant medical imaging modality.