

Reportback from iThemba LABS: Some tales of broken targets, split beams and particle tracking

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Introduction

iThemba LABS started 2006 with one bombardment station handling batch targets with 66MeV protons up to a maximum 100uA. In 2010 we have four bombardment stations and the ability to split beam to two stations increasing the total intensity on target to 350uA. We have reported in previous meetings on the vertical bombardment station for large batch targets at high currents as well as the degrading system to produce F-18 on a commercial water target. This report will look at some successes and failures of these systems and highlight the new developments at the lab.

Broken targets etc.



Fig 1: When 66 MeV Strikes



Fig 2: Broken Ga Target

The vertical bombardment station (VBTS) at iThemba LABS has now been in operation for 4 years and has seen just over 1 million micro-amp hours of beam. We have experienced a number of target (Fig 2) and infrastructure (Fig 1) failures, especially of gallium metal targets. We have implemented a number of measures (Fig 3) to reduce the frequency of breakage of these.

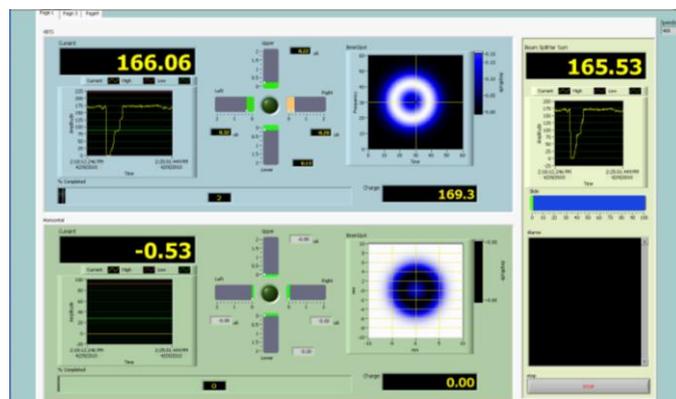


Fig 3: New Diagnostics

Beam Splitter

We have implemented an electrostatic channel and a septum magnet (Fig 5), to obtain separated but simultaneous beams for the vertical and horizontal bombardment stations. This is based on the system for splitting employed at the Paul Scherrer Institut. (Conradie et al. 2007)

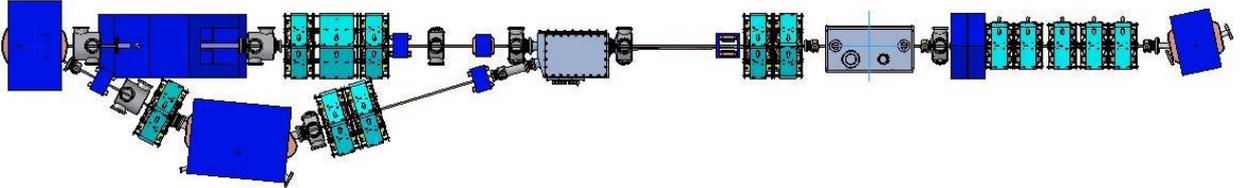


Fig 5: Split Beamline

PEPT

Positron emission particle tracking (PEPT) was developed at the University of Birmingham (Hawkesworth et al., 1991; Parker et al., 1994). Since the arrival of the ECAT 'EXACT3D' (Model: CTI/Siemens 966) PET camera (Fig. 6), from Hammersmith Hospital Cape Town now boasts the second dedicated PEPT lab in the world.

Initial runs (Fig 7) with tumbling mills, flotation cells and even an angle grinder have proven very successful and development of tracer manufacture using both ion-exchange labelled particles and directly activated particles is continuing well.



Fig 6: EXACT3D in its new home

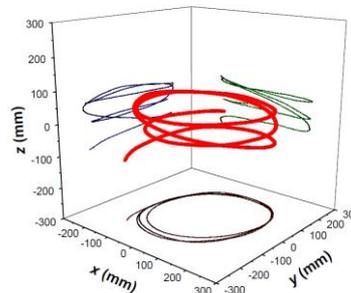


Fig 7: First PEPT run

References

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