Optical Diagnostic Results of MERIT Experiment at CERN

HeeJin Park

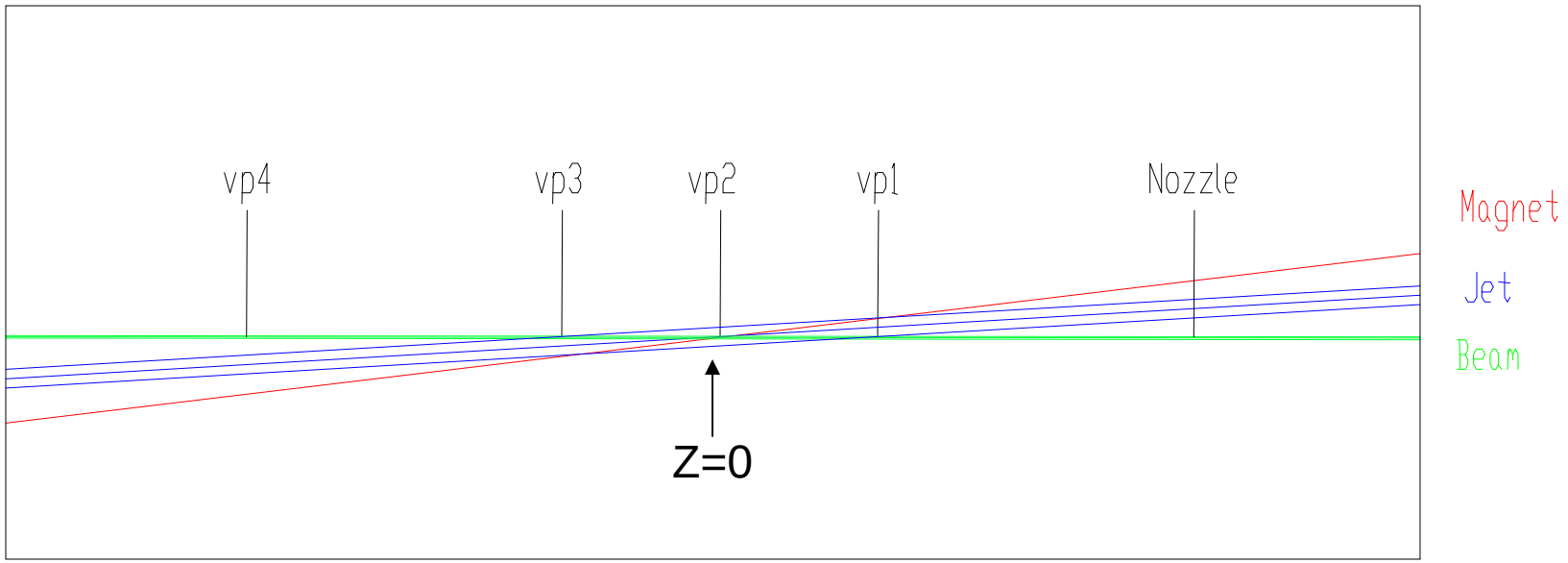
Optics Configuration with respect to Beam

Total 360 beam shots performed.

Images for 260 beam shots are collected.

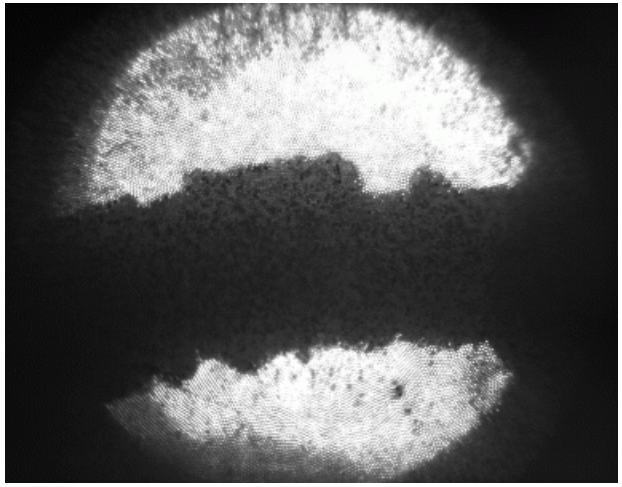
MERIT beam shot summary website,

http://www.hep.princeton.edu/~mcdonald/mumu/target/hkirk/MERIT_Beam_Program_110607.pdf

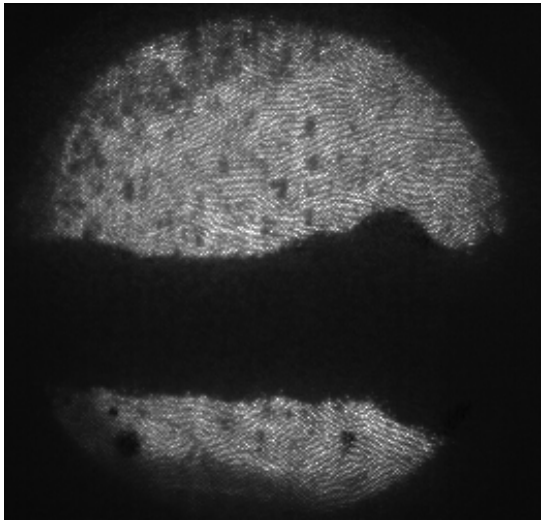


Observation : Interaction of Hg Jet with 14 GeV Beam

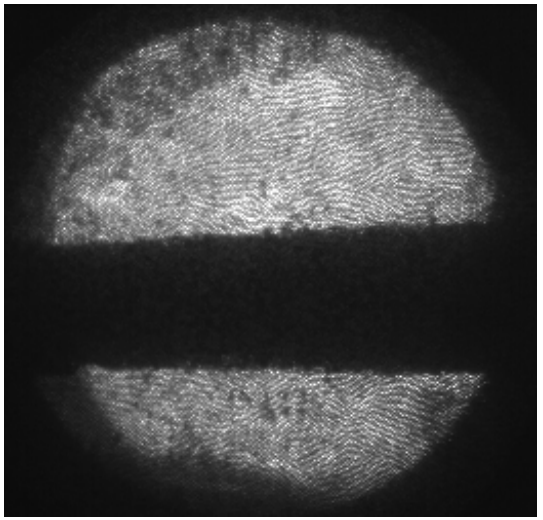
0T, 8TP



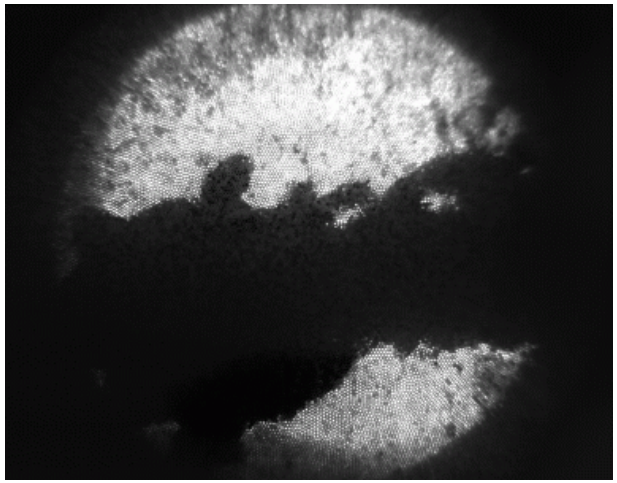
5T, 16TP



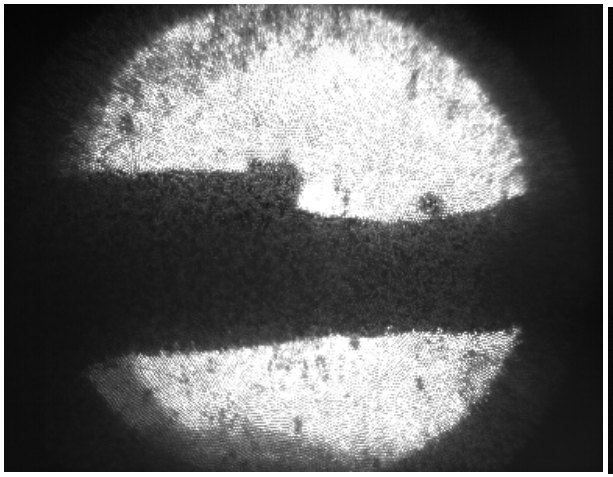
10T, 12TP



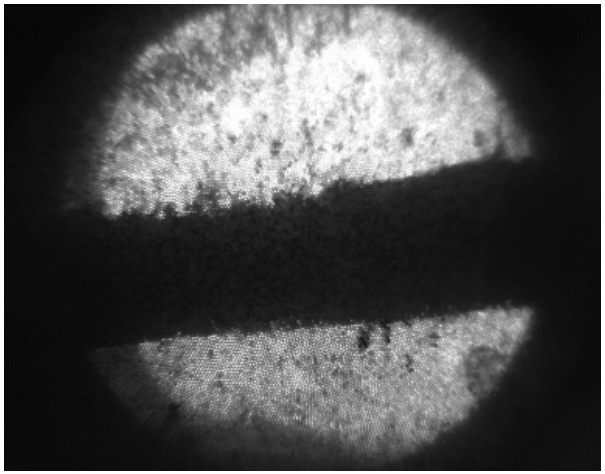
0T, 4TP



5T, 16TP

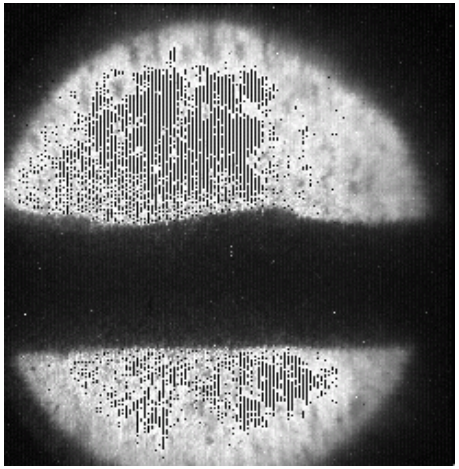


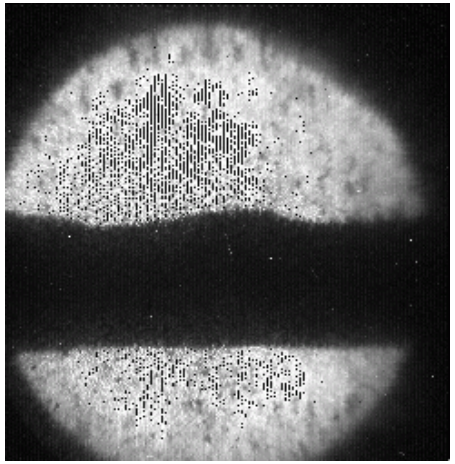
10T, 20TP

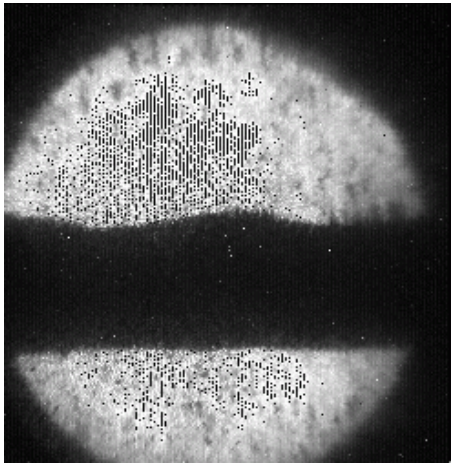


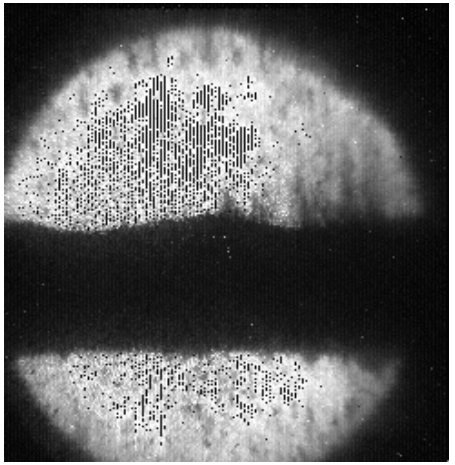
Observation : Velocity of Splash, 24GeV

3.8TP, 10T V = 24 m/s

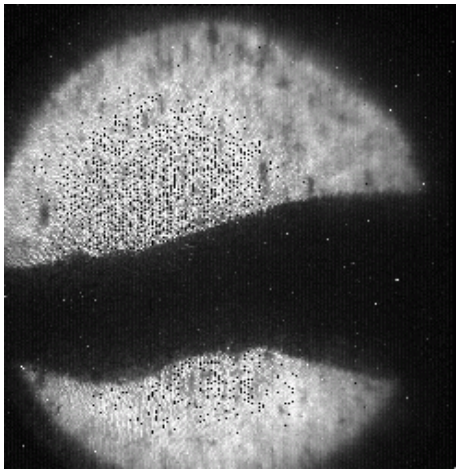

t=0

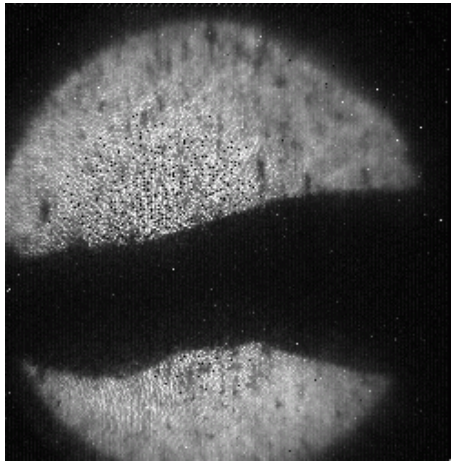

t=0.150 ms

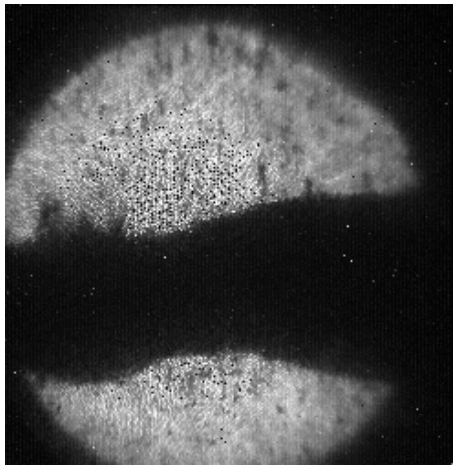

t=0.175 ms

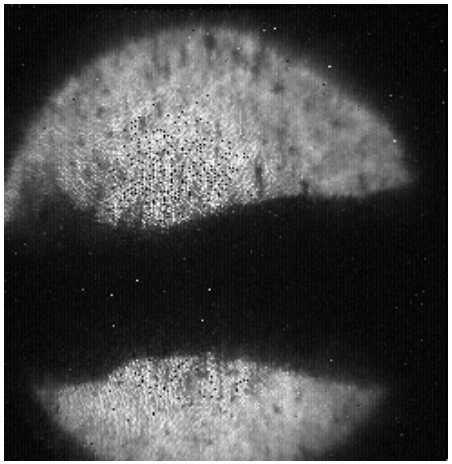

t=0.375 ms

6TP, 5T V = 47 m/s


t=0

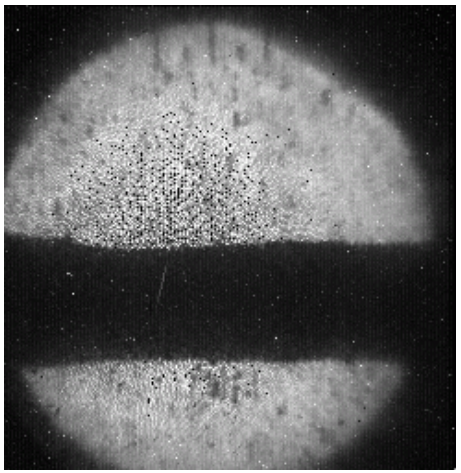

t=0.050 ms

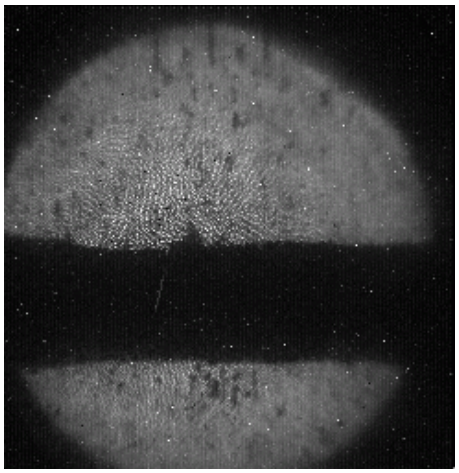

t=0.175 ms

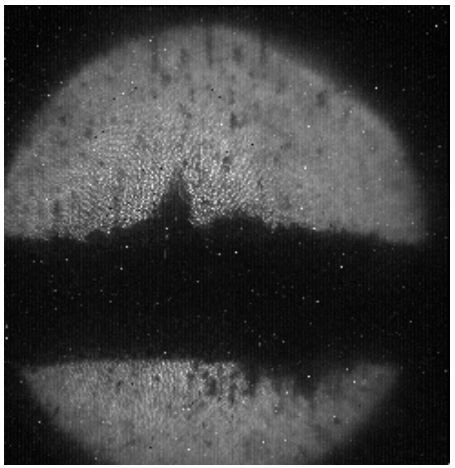

t=0.375 ms

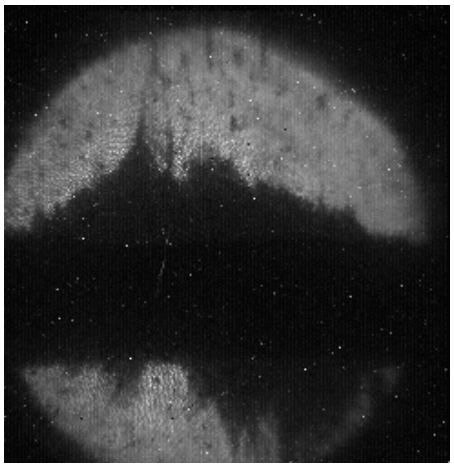
Observation : Velocity of Splash, 24GeV

10TP, 10T V = 54 m/s

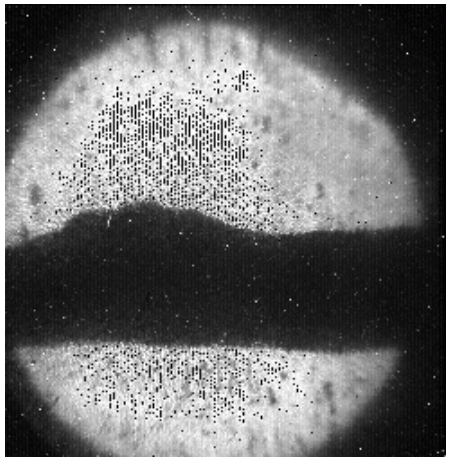

t=0

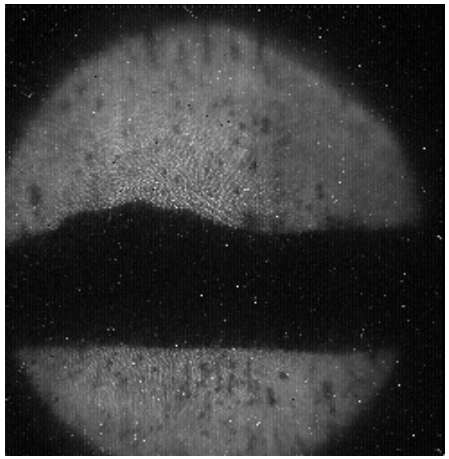

t=0.075 ms


t=0.175 ms

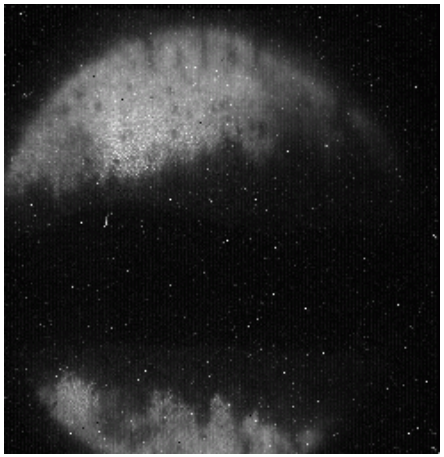

t=0.375 ms

20TP, 10T V = 65 m/s

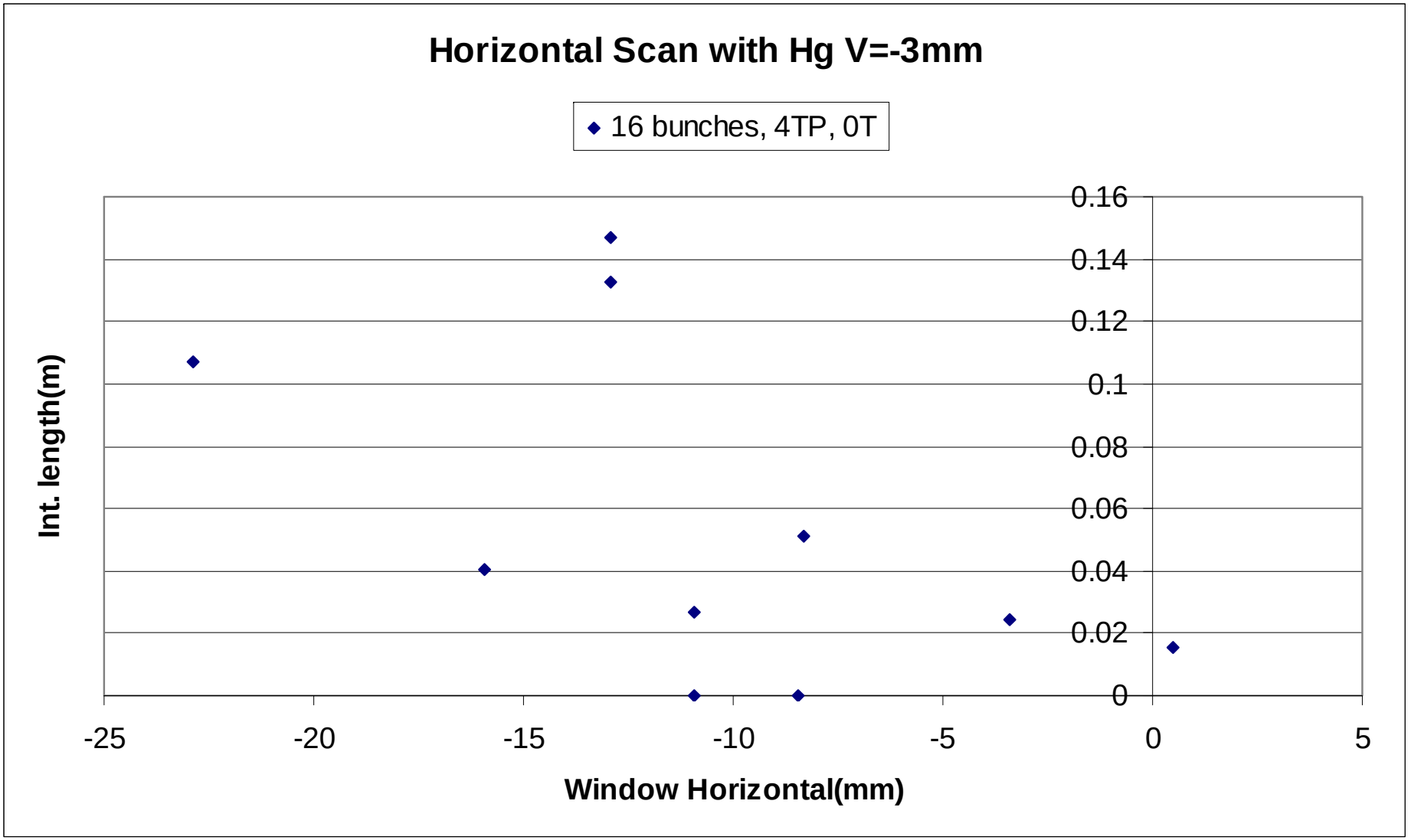

t=0


t=0.050 ms

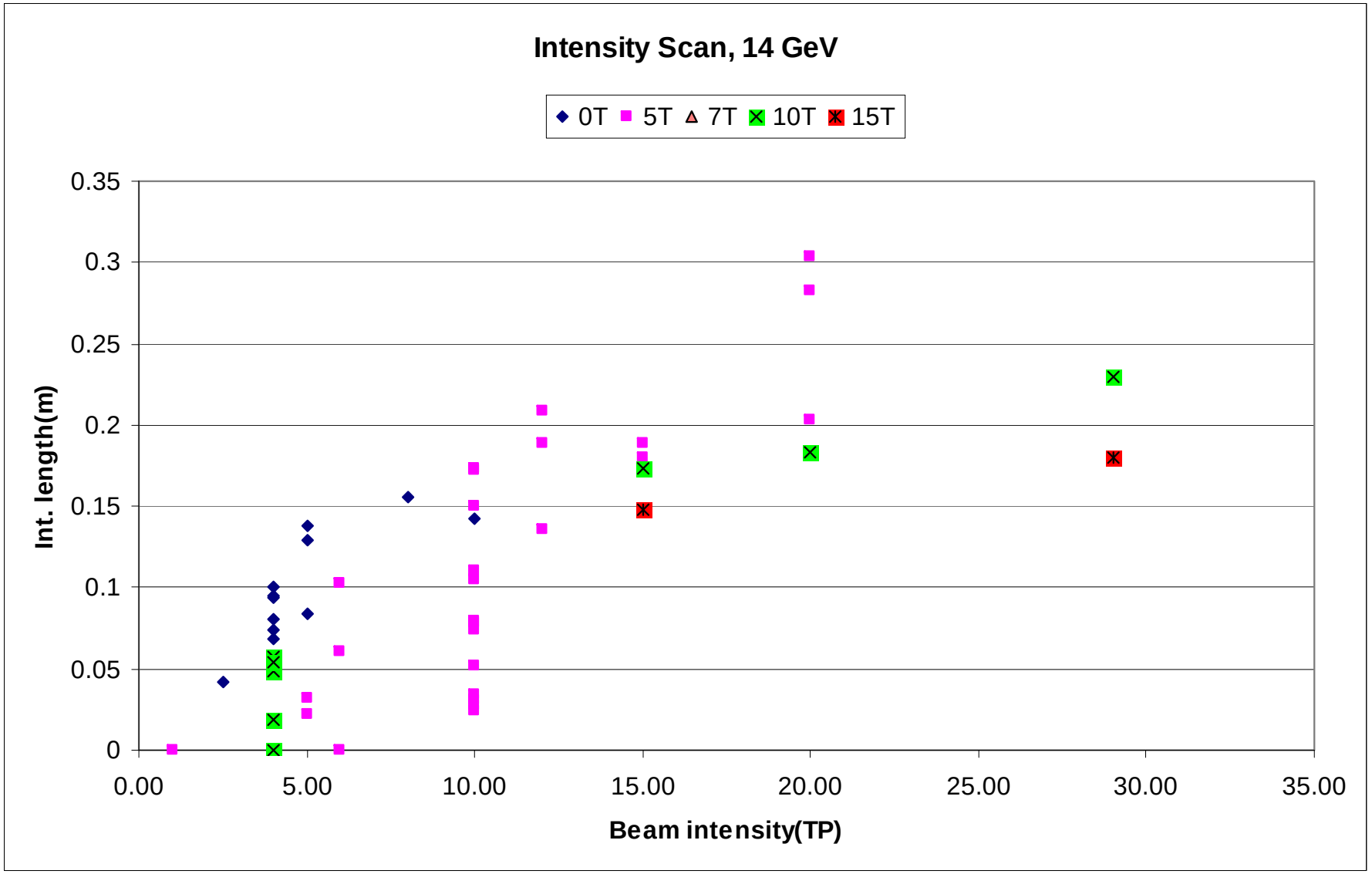

t=0.175 ms


t=0.375 ms

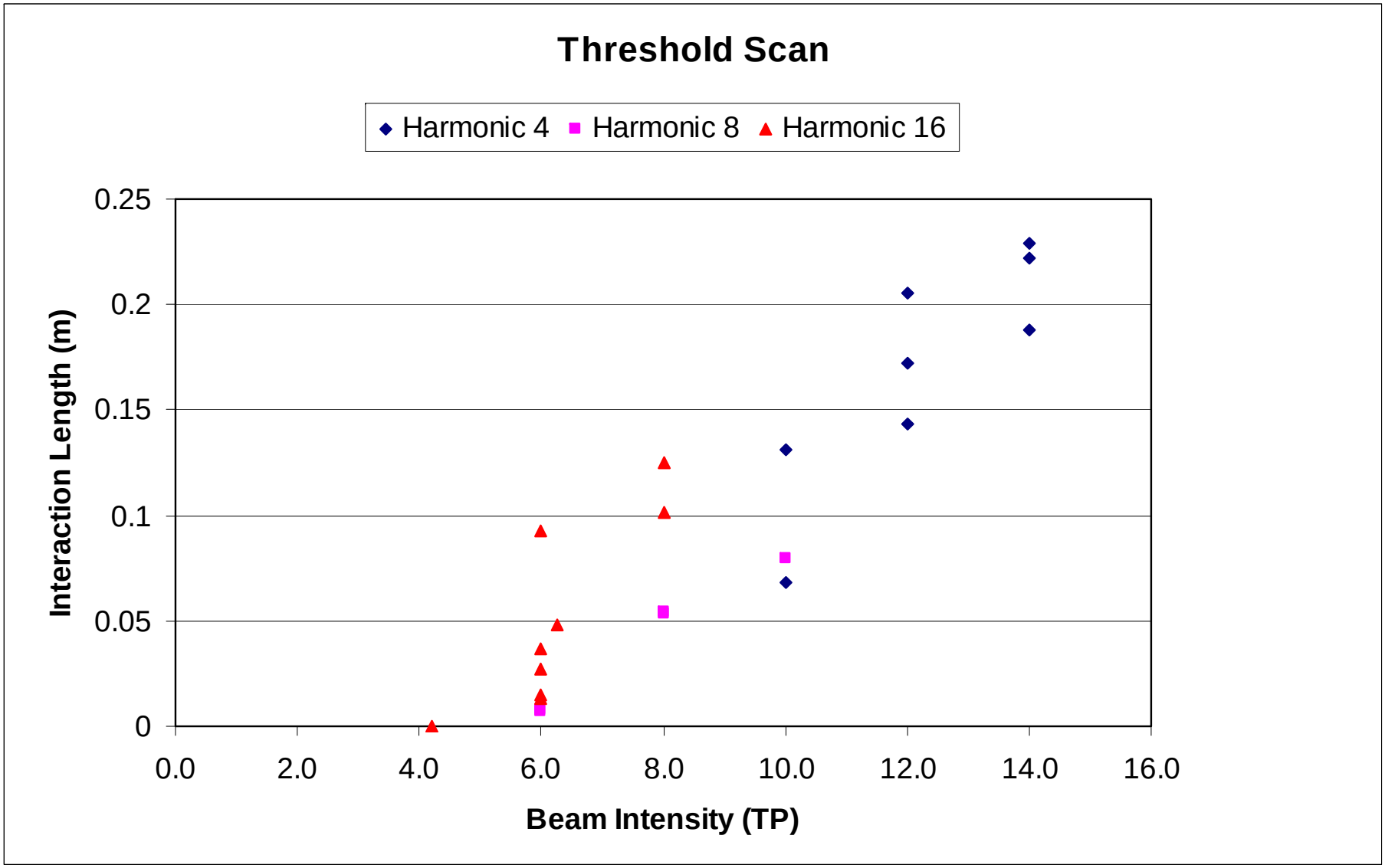
Horizontal Scan with Target In, 14GeV Program



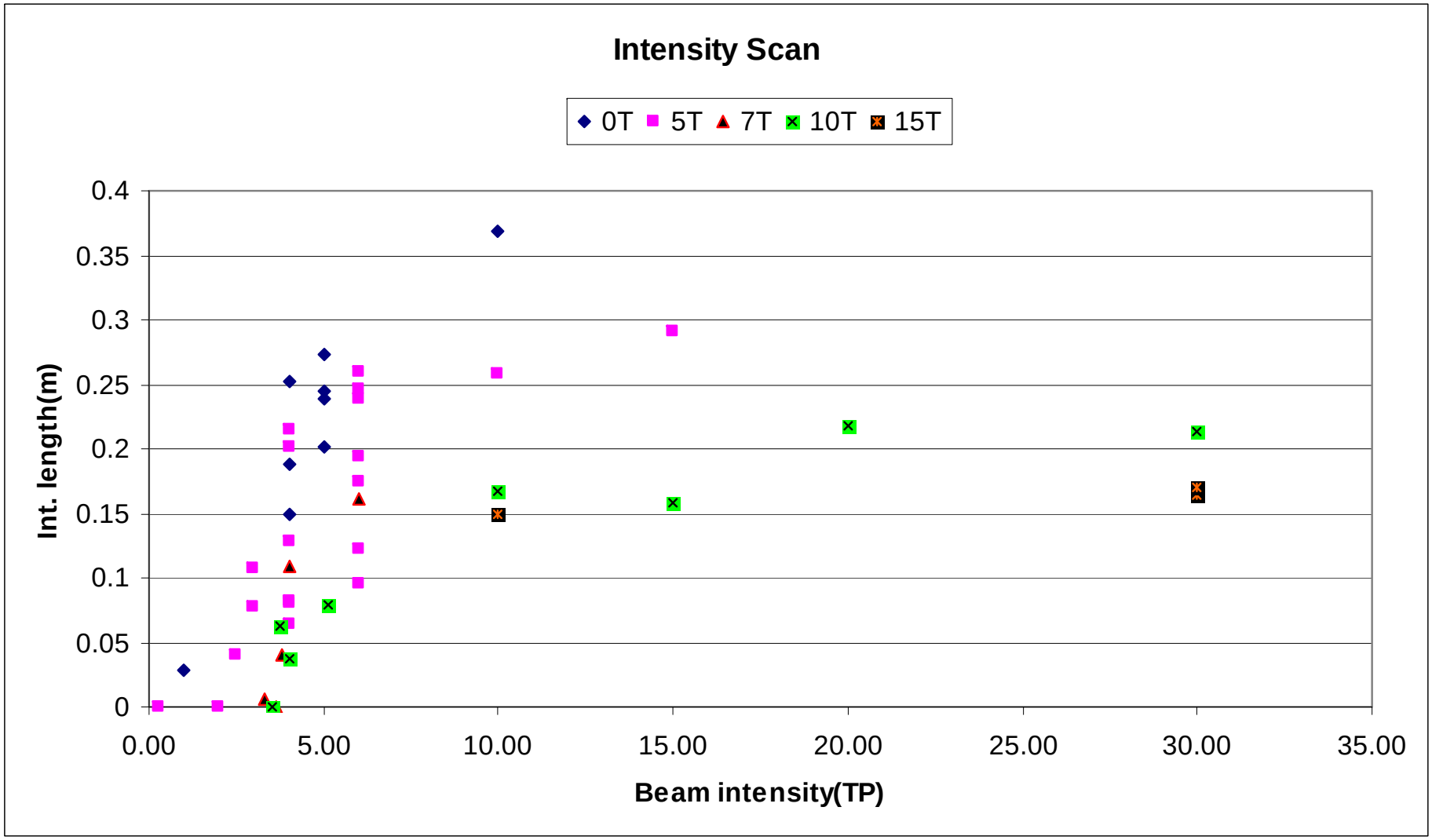
Intensity Scan, 14GeV Program



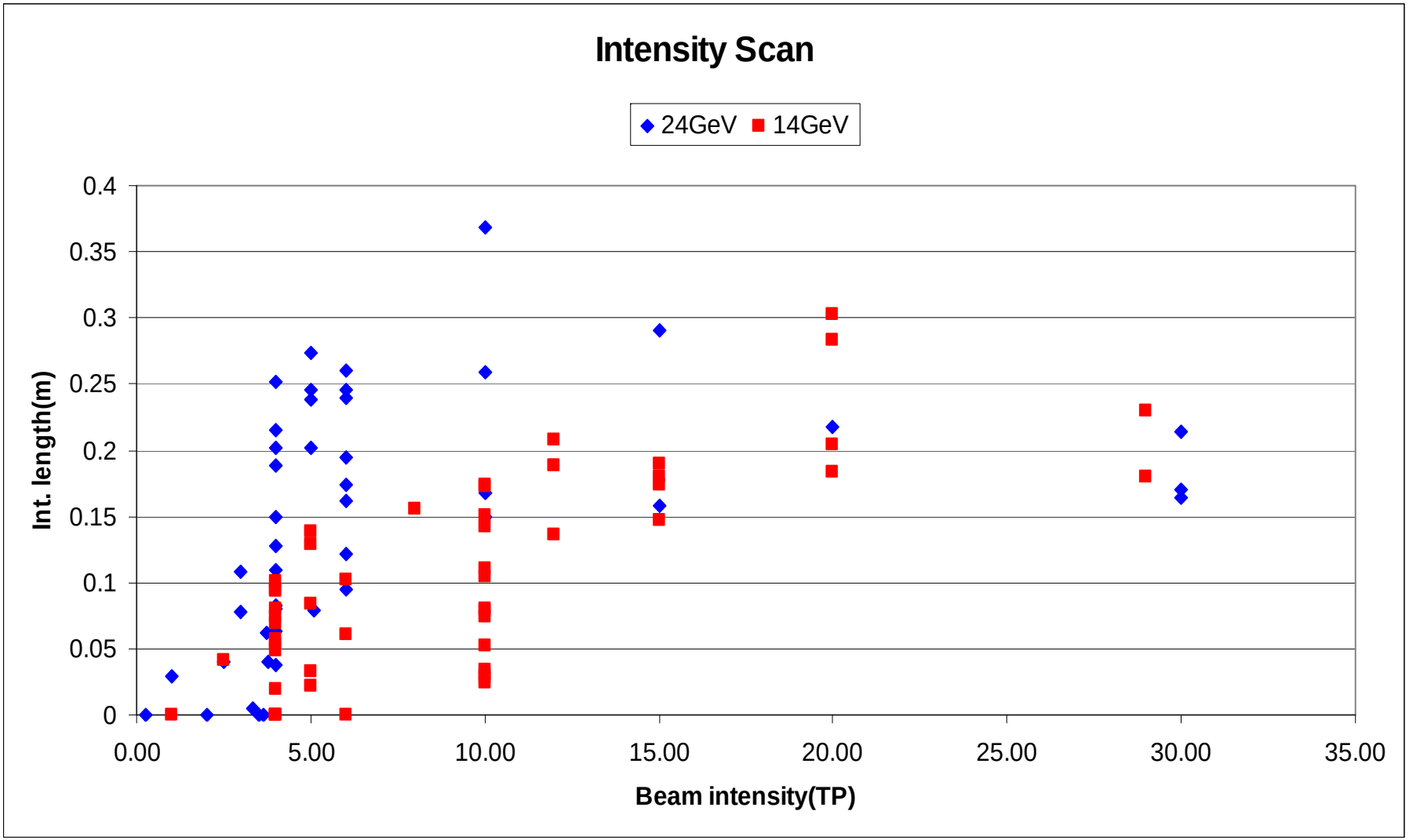
Threshold Scan, 14GeV Program



Intensity Scan, 24GeV Program



Intensity Scan, 14GeV vs 24GeV Program



Conclusions

1. It is observed that the splash begins at the bottom of jet and ends at the top of jet. which is consistent with the beam trajectory.
   Under relatively strong intensity of beam, jet breaks up but can be confined by magnetic field. The breakup line might be consistent with the beam trajectory and the product of cavity caused by the energy deposition of beam.

2. The splash velocity increases as the beam intensity goes up.
   However, magnetic field will reduce the effect.

3. As the beam intensity goes up, the interaction length increases and it is somewhat suppressed by magnetic field.

4. 24GeV beam has longer interaction length than 14GeV beam. The intensity of threshold in 24GeV beam is lower than 14GeV beam.