The MERIT experiment is a proof-of-principle test of a target system for a high power proton beam to be used as front-end for a neutrino factory or a muon collider. The experiment took place in autumn 2007 with the fast-extracted beam from the CERN Proton Synchrotron (PS) to a maximum intensity of $30 \times 10^{12}$ protons per pulse. We report results from the portion of the MERIT experiment in which separated beam pulses were delivered to a free mercury jet target with time intervals between pulses varying from 2 to 700 $\mu$s. The analysis is based on the responses of particle detectors placed along side and downstream of the target.

**INTRODUCTION**

The MERIT experiment represents an important milestone in the R&D program of high-power targetry for a future neutrino factory or muon collider. It combines for the first time a free mercury jet and a focusing/capturing solenoid for secondary pions or muons as proposed in design studies for future facilities.

**THE TARGET**

**Hg-jet parameters**
- 1 cm diameter, velocity up to 20 m/s
- Proton beam $\rightarrow$ solenoid axis 67 mrad
- Proton beam $\rightarrow$ mercury jet $\sim$50 mrad
- Interaction region $\sim$30 cm

**Optical diagnostics**
- Observe the mercury-jet / beam interaction using high-speed cameras
- Four locations along the jet inside the magnet bore

**THE PUMP-PROBE RESULTS**

The observed values are consistent with no reduction in particle production for bunches 40 or 350 $\mu$s after a first set of bunches, and about 5% reduction for bunches delayed by 700 $\mu$s. This indicates that a mercury jet target, although disrupted by intense proton bunches, would remain fully effective in producing pions during a bunch train up of 300 $\mu$s as may be desirable for operation of a 4-MW proton driver at a Neutrino Factory.