Muon-S: Focussing on objectives meeting

Abingdon, September 30, 2004

The second semi-annual meeting of the MUON-S JRA was held at the Cosener's House, Abingdon, UK on September 30th 2004.

Agenda:

1. Communications from the JRA Coordinator,
2. Instrument developments,
3. New instruments,
4. Meetings and reports,
5. Human resources and collaborations,
6. Other business.

Attending:

- C. Bucci (Partner INFM-Parma)
- T. Lancaster (Oxford)
- P. King (Partner ISIS)
- S. Blundell (Partner Oxford)
- R. De Renzi (INFM-Parma)
- E. Morenzoni (Partner PSI)
- R. Scheuermann (PSI)
- S. Cottrell (ISIS)
- J. Lord (ISIS)

Apologies from D. Herlach and T. Shiroka.

1. Communications from the JRA Coordinator.

From the NMI3 Coordinator we have learned that a summary report of the first year activity will be presented at the NMI3 Meeting at PSI on Oct. 7-8, 2004. The full reports for each JRA will be

prepared for the January 2005 meeting of the Consortium. All members of JRA8 are therefore asked to be on stand-by for reporting the details of their activity, most of which will be discussed today.

2. Instrument developments.

1. WP1 Objective: R. Scheuermann reported on preliminary investigations of fast-timing detectors in high magnetic fields. Comparison between Avalanche Photodiodes (APD) and Hybrid Avalanche Photodiodes (HAPD) in high magnetic fields (up to 5 T). Relevant topics in this context are the fast response (with goal at 50 ps, starting from present performance at about 500 ps) for diodes developed within the PSI-Dubna collaboration, operating regimes, active areas and costs. Alternative commercial contacts with Hamamatsu are in progress.

The first goal is the development and building of the first worldwide prototype of a compact beam profile monitor based on APDs (APD-BPM), including on-board broadband preamplifier. Full functionality tests in high magnetic fields (up to 5 T). Modification of the APD-BPM on-board electronics to handle high event rates (2×107 s-1). A discussion on the light guide fibres, on the bias and tuning of each preamplifier and on the choice of photomultipliers will be part of the January report. Useful information comes from the commissioning phase of the new LEM μE4 beamline.

2. WP2 Objective: R. Scheuermann also reported on the beam spot simulations and monitoring of surface muons in a 5 T solenoid. Confirmation of TRANSPORT calculations and code developed by T. Lancaster within WP2: oscillation of the beam spot size depending on the applied magnetic fields. These measurements will provide the basis for the simulations to be done within this JRA. In particular the latter will involve simulations of stopping muons and positrons emission based on GEANT4 package (WP1 and WP2 objective).

Initiation of a commercial pre-design study for a 10 T spectrometer magnet. Discussed issues were: cryogenics and magnet configuration (split-pair, etc.), detectors geometry, light guides (fibres, their length and acceptance) and PM– or APD- (outside magnet). OPERA-3d calculations of magnetic field maps for different magnet designs.

3. WP3 Objective: Demonstration at ISIS of simultaneous AC-susceptibility and μSR measurements.

Initial demonstration at ISIS of simultaneous RF excitation in two directions using crossed coils.

Initial attempt at acoustic muon spin resonance at ISIS. Further work is needed.

Beam time application submitted and approved for initial demonstration of microwave μSR at ISIS; experiment will be run in the first half of 2005.

3. New instruments.

Recent acquisitions are reported as being available for the activity of JRA8 at ISIS and PSI: dedicated lock-in amplifier for simultaneous AC-susceptibility and μSR measurements (WP3 objective); multi-channel Photomultiplier Tube (Burle Planacon 85001 501) for investigating the timing properties in high magnetic fields.

4. Meetings and reports.

Minutes of the first start-up meeting of the MUON-S JRA held at the Paul Scherrer Institut, Villigen, Switzerland on January 28, 2004 are available on the JRA8 WEB page.

Preliminary reports about tested APD and HAPD devices are available and posted at the JRA8 website.

5. Human resources and collaborations.

Appointment of Post-Doctoral worker for Instrument Simulation (WP2). Tom Lancaster, based at Oxford, starting October 1st 2004. Tom Lancaster will familiarise with GEANT4 and other packages while reproducing previous calculations in order to tackle the calculation of field maps.

Appointment of Post-Doctoral worker for Detector Development (WP1). Toni Shiroka, based at Parma/PSI, starting November 1st 2004. Toni Shiroka will run simulations of charged particles tracks (muons and positrons) in the specific case of position sensitive detectors, in order to suggest the most appropriate geometry for the desired spatial resolution. In addition TS will participate to the tests of the hardware modules (PSI and ISIS modules).

An initial collaboration with Z. Sadygov (JINR, Dubna) will be strengthened to further develop the APD-BPM detectors (Dubna R8). Expected improvements include better timing and higher sensitivity to blue light (400 nm – from ultra-fast plastic scintillators).

6. Other business.

N/A.