

2nd Workshop on High Energy Proton Microscopy

Executive Summary

The second workshop on High Energy Proton Microscopy (HEPM) met on June 2 to 4, 2010 at the Institute of Problems of Chemical Physics RAS in Chernogolovka, Russia. The main purpose of the workshop was to continue and enhance the exchange of ideas on application of high spatial and temporal resolution proton microscopy for fundamental research that has been started during the 1st HEPM workshop in 2009. 35 scientists representing 10 institutes and universities from Germany, Russia, and the United Kingdom attended the workshop.

The current status of the existing and planned HEPM facilities in the United States (LANL), Russia (ITEP) and Germany (GSI) has been presented and discussed. Some results of high energy density (HED) physics experiments performed at ITEP proton microscope have been presented as well. A novel design of the high-gradient permanent magnet quadrupole (PMQ) lens for the PRIOR (Proton Microscope for FAIR) facility and the prototype test results have been reported.

Other areas of discussion included physical and technical issues of achieving ultimate spatial, temporal and density reconstruction resolution and metrological processing of radiographic images, compact drivers for dynamic experiments such as rail-guns, small gas guns and small-load high explosive generators. A number of bright proposals on basic physics experiments in the fields of dynamic strength of solids, dynamic liquid-liquid and solid-solid phase transitions, fast loading of porous materials, cavitation in liquids and equation-of-state of strongly coupled plasmas has been made where HEPM diagnostics would play the key role.

The workshop was concluded with a detailed discussion on the PRIOR project. It started with a fruitful exchange of ideas about scientific program for PRIOR at GSI that lead to a significant push for the PRIOR White Paper. The developing of a strong international user community around the PRIOR project has also been discussed with an emphasis on involving new research groups and institutes from Russia, United Kingdom and France. The PRIOR time schedule and milestones have been critically assessed in order to ensure the soonest commissioning of the 4.5 GeV proton microscope facility at GSI. A dedicated discussion on the type, main parameters and construction schedule of the PRIOR PMQ lenses took place as well. The participants have underlined the urgency of the world-wide unique PRIOR microscope for the contemporary HED physics research.

Finally, the present and foreseen financial and in-kind contributions to the PRIOR project have been examined with a link to the project time schedule, in order to complete the construction and commissioning of the facility by the end of the year 2012.

It was proposed that the 3rd HEPM workshop will be hosted by LANL in Los Alamos, USA in 2011. In the meantime, the next PRIOR research coordination meeting will take place in Darmstadt, Germany, in September 2010, parallel to the 18th International Symposium on Heavy Ion Inertial Fusion.