



Muon diagnostics of heliosphere and the near-Earth space: first results and perspectives

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Muon diagnostics is a new technique of remote monitoring of various dynamic processes in the heliosphere and in the Earth's magnetosphere based on the analysis of spatial-angular and temporal variations of muon flux simultaneously detected from all directions of the upper hemisphere. For practical realization of the technique, multi-directional muon detectors (hodoscopes) with large acceptance and high angular accuracy were designed and constructed in MEPhI (Moscow). In frame of IHY, the Coordinated Investigation Program "Muon diagnostics of heliosphere and the near-Earth space" (CIP #58) have been proposed and is now being carried out.

First results of analysis of long-time monitoring of heliospheric disturbances and space weather events during 2006–2007 show that registration of muon flux in hodoscopic mode gives unique real-time information about phenomena in the interplanetary space related with solar activity. For example, the loss-cone effect from ICME moving to the Earth was observed in muon hodoscope data 40 hours before the shock arrival when magnetized plasma cloud was yet far from the Earth.

Perspectives of the use of muon diagnostics for remote localization of disturbed regions in near-terrestrial space and forecasting potential of the method are also discussed.