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Muonography based on emulsion detectors in Russia

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A collaboration of MISIS, MEPhI, SINP of MSU and LPI of RAS based on emulsion detectors has developed and is actively using in Russia a scientific engineering and technological concept of muonographic work, the created equipment and software. A successful series of works on muonography of large objects has been completed: assessment of the technical condition of the equipment of the distillation column of the oil refinery by order of the Swiss company Sulzer, muonographic surveys of the mine of the Geophysical Service of the Russian Academy of Sciences in Obninsk, inertial drums of the tire stand of the Research Institute of the Tire Industry, etc. The muonography method was used to carry out the first surveys of cultural heritage sites - a unique archaeological site in the Naryn-Kala fortress (Derbent); buildings and territory of the Holy Trinity Danilov Monastery in Pereslavl-Zalessky - the work was awarded the Makaryev Nature Science Prize in 2022; previously unknown cavities were discovered in the cave church of the Pskov-Pechersky Monastery; A muonographic survey of the territory and hidden structure of the buildings of the Spaso-Kamenny Preobrazhensky Monastery founded in 1260 on Kamenny Island in Lake Kubenskoye was carried out. The author's methodological approaches and technical solutions using emulsion track detectors, as well as the results of the conducted investigations, are of great importance from the point of view of further implementation prospects of an effective, economical and environmentally safe method of muonography, as a method of non-destructive study of the internal structure of natural, industrial and architectural objects and for the creation of monitoring systems for problem objects to minimize the consequences of possible natural and man-made disasters for the population, infrastructure and the environment.

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