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Atmospheric measurements by Medipix-2 and Timepix Ionizing Radiation Imaging Detectors on BEXUS stratospheric balloon campaigns

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Results of the first two experiments using semiconductor pixel detectors of the Medipix family for cosmic ray imaging in the stratospheric environment are presented. The original detecting device was based on the hybrid pixel detectors of Medipix-2 and Timepix developed at CERN with USB interface developed at Institute of Experimental and Applied Physics of Czech Technical University in Prague. The detectors were used in tracking mode allowing them to operate as an „active nuclear emulsion".
The actual flight time of BEXUS7 with Medipix-2 on 8th October 2008 was over 4 hours, with 2 hours at stable floating altitude of 26km. BEXUS9 measurements of similar duration by Timepix, Medipix-2 and ST-6 Geiger telescope instruments took place in arctic atmosphere below 24km altitude on 11th October 2009. This balloon platform is quite ideal for such in-situ measurements. Not only because of the high altitudes reached, but also due to its slow ascent velocity for statistically relevant sampling of the ambient environment for improving cosmic ray induced ionisation rate model inputs. The flight opportunity for BEXUS student projects was provided by Education department of the European Space Agency (ESA) and Eurolaunch - Collaboration of Swedish National Space Board (SNSB) and German Space Agency (DLR).
The scientific goal was to check energetic particle type altitudinal dependencies, also testing proper detector calibration by detecting fluxes of ionizing radiation, while evaluating instrumentation endurance and performance.