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Panther - a new single-crystal thermal-neutron time-of-flight spectrometer

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Panther is a new thermal-neutron direct-geometry hybrid time-of-flight spectrometer at the Institut Laue-Langevin. Phase-1 of the project is completed, and the design and performance of the instrument will be discussed. Panther is equipped with two double focusing monochromators: a pyrolytic graphite for which the (002), (004), and (006) reflections are routinely used, and a copper monochromator where both the (220) and (331) reflections can be used. The beam is pulsed by a Fermi chopper with a maximum speed of 500 Hz and which can be operated in time-focusing mode. A huge array of 288 position-sensitive 3He detectors of diameter 22 mm and length of 2 m covers angles in the horizontal plane between -16 and +136 degrees and in the vertical plane between -13 and +28 degrees. This corresponds to a solid angle of 2 steradians, making the instrument ideally suited for studies of single crystalline samples. A radial oscillating collimator reduces the parasitic scattering from the sample environment and the evacuated detector tank is shielded by 30 cm of borated high-density polyethylene to reduce background. Incoming energies between 7.5 and 150 meV are currently available. The flux at the sample position for an incoming energy of 19 meV is 5E5 n/cm2/s. The energy resolution at elastic energy transfer varies between 4 and 6% of the incoming energy. In phase-2 of the project, five new disc choppers will be installed upstream from the Fermi chopper and monochromator to reduce background and order contamination, and a device for polarization analysis, PASTIS-3, is being developed.

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