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# Construction and applications of the VSANS instrument at CSNS

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A multi-slit very small angle neutron scattering (MS-VSANS) instrument has been developed at the China Spallation Neutron Source (CSNS), marking the first VSANS instrument based on a spallation neutron source. This MS-VSANS instrument boasts an excellent signal-to-noise ratio and offers a broad scattering vector range from 0.00028 to 1.7 $\text{Å}^{-1}$. It is designed for rapid transitions between various operational modes. In the conventional SANS mode, three motorized, high-efficiency $^3$He tube detectors within the detector tank simultaneously cover scattering angles ranging from 0.12° to 35°. In the polarizing SANS mode, a double-V cavity generates highly polarized neutrons, while a high-efficiency $^3$He polarization analyzer facilitates full polarization analysis. In the VSANS mode, an innovative high-resolution gas electron multiplier (GEM) detector extends the coverage of scattering angles from 0.016° to 0.447°, with a minimum scattering vector of 0.00028 $\text{Å}^{-1}$. The absolute scattering intensities in both the SANS and VSANS modes have been accurately determined using the direct beam technique and the desmear algorithm. The validity of these methods has been confirmed through tests with standard samples, and by comparing the results with those from a benchmark instrument. After being open to the scientific community for one and a half years, the applications and outcomes of the instrument will be discussed.

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