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SANS-1MAX: Massive Q-Range Upgrade

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The SANS-1MAX proposal aims both at extending the dynamical Q-range and increasing the maximal momentum transfer Q. The SANS-MAX proposal consists of two independent two subprojects. (i) The replacement of the S-bender neutron guide with an optimized version will shift the wavelength cut-off down to ~2.5 Å. (ii) The installation of a second, high-Q detector bank at short detector distances on a second, independent detector carriage will largely improve the dynamic range.

Both upgrades will enable the access to new fields of research, particularly for modern engineering materials science and metallurgy applications and energy materials. The increased dynamical Q-range is particularly beneficial for the growing demand of in-situ measurements of irreversible processes, e.g., precipitation growth in high performance alloys, quenching of alloys, rapid heating and cooling processes and the mimicking of metal process chains, in particular in combination with sample environment like the dilatometer. Accessing larger Q allows measuring even smaller correlations of a few atoms to study the early growth of precipitates. A maximum momentum transfer of 2.2 Å^-1 of the SANS-1MAX proposal will finally allow covering the first Bragg peaks of typical alloys like e.g. Ni or Co based superalloys and their main precipitates. This option will enable coherent investigations of early stage precipitation covering the SANS and diffraction region in a single measurement. It hence allows an analysis of the size, size distribution, shape and the crystalline properties of precipitates. Besides materials science, SANS-1MAX will also tremendously increase the overall efficiency of SANS-1.

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