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An indirect spectrometer of type Mushroom for the FRM II

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Magnetic systems are a fertile ground for the design of novel quantum and topologically non-trivial states characterized by exotic excitations. Examples include spin chain and square-lattice low-dimensional antiferromagnets, quantum spin liquid candidates, spin-ice compounds, and unusual spin textures. Key features of the ground state and finite-temperature behavior of such magnetic systems are captured by the spectrum of their excitations. Their intrinsically complex dispersion relations occupy large volumes in the (Q, E) space and require long measurement times when measured on triple-axis spectrometers. Instead the use of a multiplexing secondary spectrometer allows for exploring the (Q, E) space more efficiently.

We therefore propose an indirect-geometry spectrometer with a time-of-flight primary chopper spectrometer including an advanced nested-mirror neutron optics providing a well-defined and very bright beam spot at the chopper position giving flexible means to adjust the primary resolution. The secondary spectrometer consists of a large spherical crystal analyzer covering the upper part of the instrument and a flat detector area below the sample position. It realizes a large acceptance of the analyzer crystal array making use of crystals with a wide mosaic spread and recovering a good energy resolution via the so called prismatic focusing. The accessible wavelength band is foreseen to be 1 –10 Å with an adjustable wavelength resolution of 1%- 5%.

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