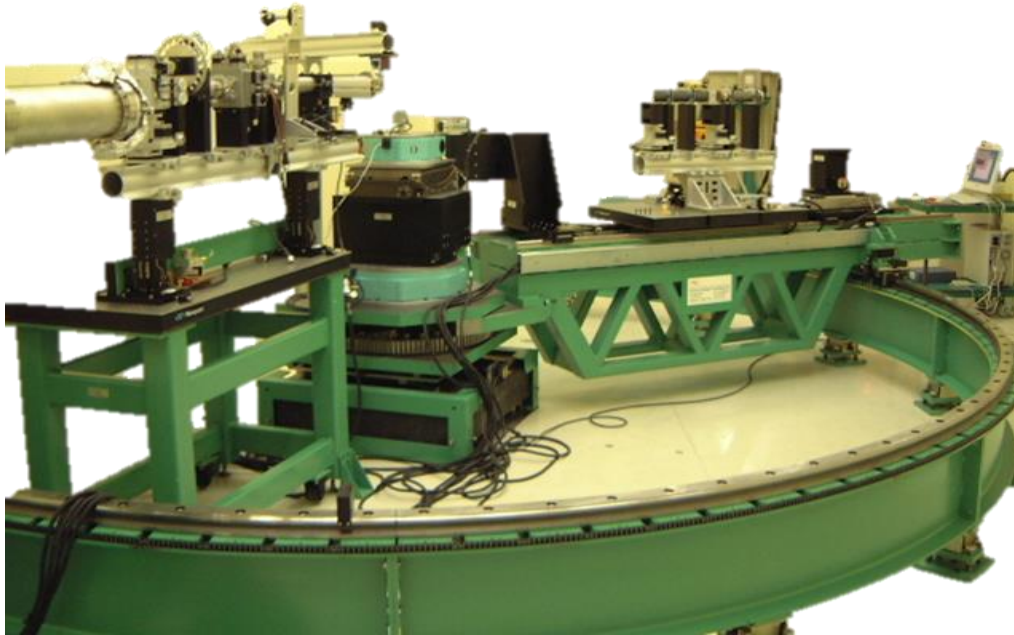


Spectrometer for Inelastic X-ray Measurements



Customer:

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This spectrometer is operating at the Spring-8 synchrotron in Japan as part of a dedicated inelastic beamline (BL12XU). The system is used for investigating electronic excitations with milli-electron volt resolution; therefore, many of the specifications require high precision, and accuracy on the micron level. The 3-meter analyzer arm on the spectrometer needed to have an angular stability measured in arc seconds over a long range of travel, under vacuum conditions. The spectrometer was designed for several types of inelastic X-ray measurements, such as performing non-resonant inelastic X-ray scattering, which directly measures the dynamical structure factor of the sample. The scientific focus is to study the single-particle and collective electronic excitations in many-body systems. The incident table allows for diagnostics, attenuation of the highly monochromatic beam, and reduction of parasitic scattering. In addition to the standard capability of orienting the sample, the spectrometer is used with large magnets, furnaces, or a specially designed cryostat with a fine-positioning carrier, for measurement of samples in extreme environments. In the initial phase, the spectrometer has a one-, two-, or three- meter radius spherically bent silicon analyzing crystal, allowing for a range of energy resolutions of around 100 meV to 1 eV. The spectrometer has the custom designed versatile capability of positioning a shielded detector in the backscattering geometry for use with various sample chambers, which allows for optimizing the energy resolution. The second purpose of the spectrometer is for Resonant Raman scattering, to capitalize on the large resonant enhancement of the inelastic scattering cross sections. The incident X-ray energy is widely tunable to excite core electron absorption edges of samples ranging from the copper to vanadium.

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