

## Poster Presentation

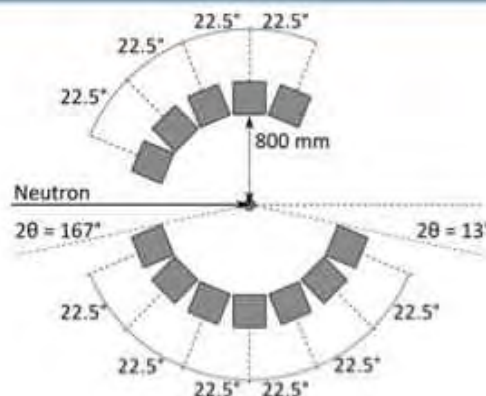
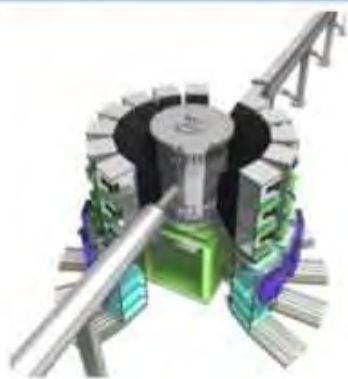
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### *Precision of the single crystal neutron diffractometer SENJU at J-PARC*

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“SENJU” is a newly built pulsed neutron single crystal diffractometer at J-PARC/MLF for structural research of inorganic and organic materials with relatively small cell sizes under multiple extreme environments, such as low temperature and a high magnetic field. Since the launch of the instrument in 2012, SENJU has been commissioned and now tuned to be capable of crystal and magnetic structure analyses with a sample as tiny as 1mm cube or less. SENJU has the total of 37 two-dimensional scintillation detectors installed. Groups of 3 detectors are accommodated in detector banks and 12 detector banks are placed so as to cylindrically surround the sample chamber (Figure), and additional one detector is settled at the bottom. The instrumental parameters including the positions of the detectors and the neutron flight path length were determined in order to obtain accurate lattice parameters of samples. Since the instrumental parameters correlate with each other, series of different measurements were needed in order to obtain unique values for each parameter. As the first step of the procedure, a powder diffraction pattern of diamond was measured in order to determine the scattering angle of 90 [deg] utilizing the nature that a Bragg reflection vertically lines up at 90 [deg]. Simultaneously, we determined the neutron path length L1 from the neutron source to the sample position. As a next step, a Bragg reflection was repeatedly measured as the sample crystal was rotated with small steps. From this data, the equatorial plane on the detectors and the distance between the sample and the detectors L2 were determined. As a third step, many Bragg reflections from a sample with known lattice constants were measured and from the positions of the reflections the positions of each detector were determined. As a result, the lattice parameters can be obtained with the accuracy of about 0.05 % using the determined instrumental parameters.



**Keywords:** neutron, J-PARC, single crystal