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INITIAL MEASUREMENT PLAN FOR SOLEIL-II BY VIBRATING WIRE AND PULSED WIRE MEASUREMENT TECHNIQUES

The construction of next-generation light sources faces a critical challenge of high-precision alignment of the ring magnets. With the aim to acquire optimal and stabilized synchrotron radiation for upgrade of SOLEIL, the magnetic elements of the synchrotron must be aligned with very high accuracy. The magnetic measurement techniques such as vibrating wire and pulsed wire can be implemented to determine and align the magnetic center of various magnets on a girder simultaneously. SOLEIL is equipped with a pulsed and vibrating wire measurement bench. The vibrating wire magnetic measurement method involves the excitation of harmonics of vibration due to Lorentz forces in the current carrying wire under the influence of magnetic field. By analyzing these oscillation harmonics, the magnetic field can be reconstructed with accuracy. The pulsed wire magnetic measurement is a vital tool for accurately mapping the magnetic fields, offering precision and sensitivity for the measurements. The pulsed wire method operates by sending an electric pulse through a taut wire placed within the magnetic field to be measured. As the pulse travels along the wire, it interacts with the magnetic field, generating a Lorentz force. This force causes a small deflection in the wire, which can be measured using optical detectors. The deflection of the wire is directly proportional to the magnetic field strength at each point along the length of the wire. By recording the wire's motion as a function of the time, the spatial distribution of the magnetic field can be accurately reconstructed.

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