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In-situ vibration measurements for evaluating impact of low conductivity water induced vibrations on Advanced Light Source upgrade (ALS-U) accumulator ring magnets and electron beam positioning monitors

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Maximum vibration limit for the magnets of the accumulator ring (AR) for the Advanced Light Source upgrade (ALS-U) project is <1 um in the transverse direction (X), <0.2 um in vertical (Y), and < 1 um in beamline (Z). For the beam position monitors (BPM), it is <140 nm in X, Y and Z. Since the ALS-U project is reusing the existing tunnel for the new AR and storage ring, a combination of floor mounted and wall mounted AR supports stands are used with first natural frequency below 20 Hz, (possibly) rendering them sensitive to flow induced vibration. Significant FEA modelling was done to estimate preliminary vibration levels, though it was challenging to model flow induced vibration, necessitating measurements. The AR is now installed in the current ALS storage ring tunnel, in order to be commissioned early, while the current ALS storage ring is operating. As part of the installation, low conductivity water flows to all the magnets and beam position monitors. A 2 week measurement campaign was set up to leave accelerometers on the AR magnets and BPM' s in the tunnel while the current ALS storage ring is running. Results were compared to the FEA predictions and to the requirements.

Footnotes

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