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Studies of the ground motion induced vibrations in FCC-ee Z mode

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Very high luminosities at the production poles (z, w, h, t) of FCC-ee are planned at the four Interaction Points (IP); thus very low beta star values are required at the IP, implying the use of very strong quadrupoles. Concurrently, LAPP work has underlined the strong correlation between the vibrations of the quadrupoles due to ground motion amplified by the dynamics of the cryostat in cantilever mode close to the Interaction Region (IR) and the variations of luminosity at the IP of SuperKEKB.

We are currently performing two distinct studies considering the z-pole optics design of FCC-ee. The first one consists to define dynamic vibrations tolerances and sensitivity in the Machine Detector Interface (MDI) region. Tracking simulations of a single beam circulating in the FCC-ee machine are performed with MAD-X, which undergoes a vertical time-dependent displacement of the first quadrupoles near the IPs. In parallel, studies have started on the effect of plane ground waves on the closed orbit of FCC-ee. A status of this frequential study will be given.

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