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Development of an Optical Inertial Sensor

In this contribution, a new prototype of optical inertial sensor and the results of huddle tests will be presented. The sensor is an interferometric absolute motion sensor, which includes two parts. One is a new designed compact optical readout. The overall size of the interferometer is within 150×100×70 mm3 (L×W×H). As it is not affected by the electromagnetic field, it will be completely compatible with accelerator environment. Currently, the resolution of the readout is about 10-13m/rtHz (RMS: 60 pm), which shows significant advantages than the commercial capacitance based or LVDT based readouts. The second part of the sensor is a mechanical pendulum, which currently is a homemade hinge. Because the thermomechanical noise highly influences the resolution of the optical inertial sensor in the low frequency domain, the mechanical structure and materials have to be studied and carefully designed. Then, huddle tests have been carried out to compare different structures and materials.

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