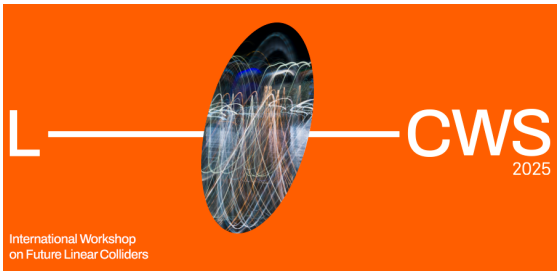

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The alignment of the accelerator modules of the Cool Copper Collider C^3 with the Rasnik 3-point alignment system

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For C^3, some 3000 accelerator sub units must be positioned, within 10 um transversal, on a 6 km long straight line. In the Rasnik alignment system, light from a point-like monochromatic source falls on a zone plate, forming a Fraunhofer diffraction pattern on an image pixel sensor. The alignment of three objects can be obtained by analysing the position of the diffraction pattern on the sensor. The alignment of a large number of objects can be realised by fixing a stick on each object, carrying the three Rasnik components. With this leap frog geometry, all sticks are mutually coupled, forming a multipoint alignment system [1].
This system should operate in ambient air, in vacuum, and in liquid nitrogen. Usable low-cost laser diodes have been found, as well as one type image pixel sensor, applied in an old Microsoft webcam. Due to the heat dissipation of these components, bubbles are formed, causing an error in the measured alignment when crossing the optical path. Various methods of beam shielding have been developed. Two Rasnik systems, placed in parallel, have been successfully tested in a cryostat at SLAC. In the Quarter Cryo Module QCM, being the new test bench of C^3, essential Rasnik studies such as bubble-induced vibrations of the accelerator components will be carried out.

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