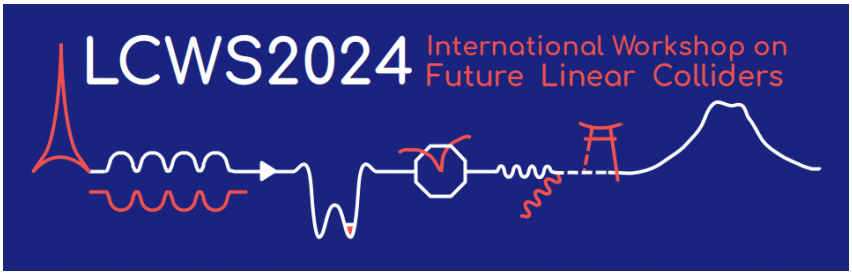

Contribution ID: **105** Type: **Oral presentation (remote)**

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

Wednesday 10 July 2024 14:30 (30 minutes)

For C^3, approximately 2000 accelerator sub units must be positioned, within 10 um transversal, on a 2.3 km long straight line for each linac.
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 analyzing the position of the diffraction pattern on the sensor.
The alignment of a large number of objects can be realized 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 that operate in these conditions 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 are presented.
With the Quarter Cryo Module (QCM), essential studies will be carried out, enabling the realization of the C3 collider. The QCM will be equipped with four Rasnik chains, measuring alignment parameters with redundancy. In addition, the bubble-induced vibrations of the accelerator components can be registered accurately.

[1] H. van der Graaf et al., The alignment of the C3 Accelerator Structures with the Rasnik alignment system. Proceedings of LCWS 2023. arxiv: 2307.07981

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