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Design and Unused Potentials of the 67-GHz Electro-Optical PCB-BAM Prototype for ELBE

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In most accelerator facilities the machine synchronization is crucial. It depends on bunch arrival-time measurements with high precision, which can be achieved either by RF synchronization or by an electro-optical detection scheme. For very low bunch charges down to a few pC, a single-digit fs resolution cannot not be reached with the state-of-the-art bunch arrival-time monitors (BAM). A new generation of pickups was proposed and gave promising simulation results. A theoretical jitter charge product in the order of 9 fs pC has been estimated for a system with updated pickups in combination with a new electro-optical modulator. As a proof-of-concept a dedicated vacuum sealed prototype was designed for measurements at ELBE. In this contribution the design of the prototype is presented, with focus on the mechanical layout and the unutilized potential for an optimized design.

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