

# SPS test-beam infrastructure extension for low temperature, fast triggering applications

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The recent rise of fast timing applications at high radiation fluences requires testing in low-temperature environments ( $< -40^{\circ}\text{C}$ ) to mitigate thermal runaway for multi-pixelated matrices bonded to readout ASICs and to regulate carrier mobility. To that end, we present an upgraded infrastructure for the EUDAQ-based AIDA telescope at the SPS North Area H6B beamline. The system integrates a 1.2 kW water-cooled, ethanol-based chiller, a low-mass,  $0.035\text{ W/mK}$  thermal conductivity wall, cold box and a two-axis (Y-Z) mechanical stage with a 34.2 kN dynamic carrying load, 5 mm pitch, and 1 m travel range. The cold box, with internal usable dimensions of  $37 \times 30 \times 31\text{ cm}$ , supports a removable DUT assembly designed for 30 nm positioning precision and plane-independent 3-axis movement (2 linear and 1 rotational). In addition, accompanying control hardware and software are under development to enable temperature and flow control, seamlessly integrating as a EUDAQ-level producer. To address the 130 nsec trigger decision latency of the AIDA TLU 2, we introduce a fast trigger decision board. The latter, targeting latencies below 10 nsec, while incorporating a synchronization subsystem with the accelerator clock, represents a critical improvement for timing applications.

## Type of presentation (in-person/online)

in-person presentation

## Type of presentation (I. scientific results or II. project proposal)

I. Presentation on scientific results

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