

03/07/2023

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| **Delay on:** | **MS8** |
| **Delivery Date in Annex 1:** | M27 |
| **Expected Delivery Date:** | M33 |

**Justification for delay**

A prototype of a EUDET-style beam telescope based on ALPIDE pixel sensors has been developed, commissioned, and rolled out to users at the DESY II Test Beam facility. It delivers the expected performance in terms of noise, timing, and rate capability. This confirms that ALPIDE is a sensible choice of pixel sensor for a EUDET-style beam telescopes upgrade.

Problems have occurred, however, in producing additional copies of this system. Significant price increases (as a consequence of the COVID-19 pandemic) of crucial components of the custom hardware would have approximately doubled the cost per telescope. Additionally, it became apparent that the designer of the custom hardware could not guarantee long-term support.

It was decided that these conditions are not acceptable and that an in-house redesign at DESY is the best way to proceed. More control over the design, selection of components with more consideration for long-term availability, full access to all design files, and integration with the Peary software developed for the Caribou DAQ system (WP3.5) will immensely benefit the maintainability of the new system. Working with designers employed by DESY ensures long-term support.

The operation of a single telescope plane has already been accomplished with the new design. A working 6-plane prototype is expected to be ready in September 2023. After this step, the hardware components for all telescope copies should be ordered as soon as possible. It is planned to have them delivered latest in December 2023. The costs of the hardware components per beam telescope are estimated to be approx. 4400 EUR (excluding sensors and mechanics), which represents a significant reduction compared to approx. 9000 EUR for the first design. A first batch of 30 ALPIDE sensors, bonded to chipboards, has already been ordered and is currently ready for shipment from CERN to DESY. Installation of the new telescopes is planned to be carried out when most convenient from the test beam facilities’ perspectives.