



To whom it may concern

Rome, June 10, 2021

Three groups led by Professor Junjie Zhu from University of Michigan, Professors Qi An and Lei Zhao from University of Science and Technology of China, and Dr. Robert Richter from Max Planck Institute, have jointly designed a TDC (Time-to-Digital Converter) ASIC for the ATLAS MDT Phase-II upgrade. Three versions of prototypes have been produced and detailed performance studies have been conducted. Each TDC ASIC handles 24 detector channels and features low readout latency, low power consumption, and a flexible data interface. According to the test results we performed, it achieves a bin size of 780 ps and a time resolution of better than 300 ps RMS, as well as two readout modes (triggerless and triggered modes) and two serial outputs, each with a rate up to 320 Mbps. The design is found to meet all specifications. The groups have performed an excellent job, and have made an important contribution to the Phase-II upgrade of the MDT electronics.

Best,

Massimo Corradi

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A handwritten signature in blue ink that reads 'Massimo Corradi'.