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The High Granularity Timing Detector (HGTD) is a phase-II upgrade project for the ATLAS detector. It is essential to validate key aspects of the detector at CERN in 2021 and 2022 in the demonstrator program. The first important part of the demonstrator project is centered around the validation of the thermal performance of the CO₂ cooling on a single readout row using silicon heaters to emulate the power dissipation of modules. This validation is meant to ensure the thermal stability of the HGTD modules with the cooling plate. Tests of the thermal stability will be performed at CERN until October 2021. The postdoctoral researcher will take a leading role in the measurements of the power dissipation and analyse the thermal performance of the heaters on the cooling plate.

In October 2021, the focus of the demonstrator project will shift to first full sized HGTD modules (LGAD silicon sensor + Front end ASIC). These will be assembled and brought to CERN where they will be installed on the cooling plate. The researcher will participate in the assembly of the modules and flexible PCBs which will be assembled at CERN. This loading procedure is a very important step to validate the loading of the final detector and will foresee the full readout path from HGTD modules to a peripheral electronics board demonstrator. The full readout chain will be exercised and studied to ensure a time resolution of 30ps is achievable for the detector in early 2022.

In addition to modules for the demonstrator, full sized modules will be tested in periodic test beam campaigns at the SPS facility at CERN when the facility restarts proton running in mid-2021. During these campaigns throughout 2022, many HGTD modules will be studied using high energy pions to understand and validate their performance before and after irradiation. The researcher will participate and focus part of their time on studying full sized modules during these test beam campaigns at CERN. Similarly, full-sized sensors will need to be tested at CERN from the various vendors which will be used to produce sensors for the final detector. The researcher will also participate in the sensor characterization in the lab at CERN.