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Serenity: An ATCA data-processing platform for CMS HL-LHC upgrades

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Serenity is a data-processing platform designed for use in the HL-LHC upgrades of the CMS tracker, endcap calorimeter and level-1 trigger, whose electronics systems will consist of several hundred cutting-edge boards connected by tens of thousands of high-speed optical links. The Serenity ATCA blade provides common services, including up to 11.6Tb/s of optical I/O and an on-board CPU. The data-processing FPGAs are hosted on daughter cards, maximising the use of common hardware across different systems. Firmware and software frameworks have been developed for the board management and for infrastructure surrounding the application-specific processing logic (e.g. links to on- and off-detector boards). In this talk, I will summarise the status of the Serenity platform, focussing on: the design of the software and firmware; how we overcame the challenge of developing common frameworks that support a diverse range of systems; and the knowledge gained from recent system tests.

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