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The Atlas IBL CO2 Cooling System

The Atlas Pixel detector has been equipped with an extra B-layer in the space obtained by a reduced beam pipe. This new pixel detector called the ATLAS Insertable B-Layer (IBL) is installed in 2014 and is operational in the current ATLAS data taking. The IBL detector is cooled with evaporative CO2 and is the first of its kind in ATLAS. The ATLAS IBL CO2 cooling system is designed for lower temperature operation (<-35°C) than the previous developed CO2 cooling systems in High Energy Physics experiments. The cold temperatures are required to protect the pixel sensors for the high expected radiation dose up to 550 fb^-1 integrated luminosity.

This paper describes the design, development, construction and commissioning of the IBL CO2 cooling system. It describes the challenges overcome and the important lessons learned for the development of future systems which are now under design for the Phase-II upgrade detectors.

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