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Sustainable cooling supply for the STS detector electronics

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Due to the extensive power dissipation of electronics, the STS detector requires liquid cooling supply. As cooling agent 3M NOVEC 649 engineering fluid or perfluoro(2-methyl-3-pentanone) was chosen not only because it is characterized by low viscosity and radiation hardness, but also due to the extremely low global warming potential (GWP). To cool down the cooling agent, a refrigeration system is required, which in turn, is subject to the climate regulations as well. For this reason, the refrigeration system uses CO2 as a refrigerant. Essentially, the cooling supply system of the STS does not cause greenhouse pollution and, thus, comply with the current and future refrigeration legislation for many years ahead.

In order to verify the green cooling supply concept, a pilot cooling plant was built on the GSI campus together with the supplementary systems to deliver the coolant to the thermal demonstrator of the actual STS cooling system. The performance of the plant and the supplementary systems has been investigated after the commissioning. Project accomplishment indicators, including not foreseen challenges, has been carefully assessed. Based on the experience got from the pilot cooling supply, a final cooling supply system will be built for the STS detector.

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