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An hybride liquid nitrogen system for the cooling of focal plane detector

For the optimal trade-off between dark current, sensitivity, and cosmetics, these detectors need to be operated at a temperature of about 155 K. The detectors mosaic with a total area of 630 cm² directly facing the Dewar entrance window, is exposed to a considerable radiation heat load. This can only be achieved with a very performing cooling system.

After a short explanation of the LN₂ solution versus mechanical cryo-coolers, the paper describes the cooling system, which is build such that it makes the most efficient use of the cooling power of the liquid nitrogen. This is obtained by forcing the nitrogen through a series of well designed and strategically distributed heat exchangers. The paper address also the specific problem caused by the change of direction associated to the telescope pointing.

In a conclusion we report about the performance of the system recorded during the laboratory system testing and the first months of operation at the telescope.

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