Contributed Talk

Closed-Cycle Dilution Refrigerator for LTD in Space Astrophysics

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The Closed-Cycle Dilution Refrigerator (CCDR) for space applications is an on-going development to improve the performance of the Open-Cycle Dilution (OCDR) successfully used on the Planck mission. This solution has been considered in various projects in X-Ray and far-infrared space instruments for astrophysics (ATHENA, SPICA) and in advanced studies for future CMB polarization surveys (COrE). Compared to the Planck mission, future applications require a lower base temperature (50mK), a higher cooling power for large LTD arrays accommodation and a longer lifetime. We discuss the integration of the refrigerator in various cooling chain solutions and present the status of the CCDR development. Compared to ADR solutions, the main advantages are 1) a stable cooling power adapted to long sky survey 2) a low mass on the coldest stages 3) a distributed cooling power avoiding thermal links in large focal plane arrays 4) the absence of magnetic field.