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LiteBIRD cryogenic chain: 100 mK cooling with mechanical coolers and ADRs

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LiteBIRD is a JAXA-led mission aimed at the studies of B-mode polarization of the cosmic microwave background. Measurements on 15 observing bands from 34 GHz to 448 GHs are made on two instruments, LFT (Low Frequency Telescope) and MHFT (Medium and High Frequency Telescope). To reach the desired sensitivities, more than 4000 TES (transition edge sensors) detectors, used on both instruments, will be cooled to 100 mK. The cryogenic design, based on shield cooling and mechanical coolers is presented in this poster. Shield cooling will be done with passive cooling and mechanical coolers. A single cryogenic chain will cool both instruments. It includes a 4K JT stage cooled with a 4He Joule Thomson cooler from JAXA, precooled by Stirling coolers. Multi-stage ADR will be optimized to provide continuous cooling at 1.75 K, 300 mK and 100 mK. 6 ADR stages provided by NASA and CEA are required and will provide efficient cooling. Details on the thermal design, preliminary sizing and expected performances are presented.

Less than 5 years of experience since completion of Ph.D

N

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N

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