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LASER COOLING. A CREDIBLE ALTERNATIVE FOR FOR MINIATURE CRYOCOOLING ?
STATUS ON CURRENT DEVELOPMENTS.

Abstract

laser cooling in solids allows compact and vibration-free cooling down to temperatures approaching 100 K. it appears as a promising technology for miniature cryocooling onboard future satellite missions. In our study, the impact of an all solid-state laser cryocooler embarked on a microsatellite was evaluated and compared to a mechanical cryocooler. The comparison criteria were the size, weight and power at payload and platform levels. Practically we intend to use a cooling head attached to the focal plane holding the instruments. The laser cryocooler design is based on state-of-the-art cooling crystals:ten per cent doped Yb:YLF inside an astigmatic absorption cell. It will be linked by a fiber to a second system that includes the opto-electronics and laser. We will present our satellite integration study and initial results on our prototype bench.