

Round Table Discussion: CMB programs in France

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The activities concerning CMB in France have a long history. Indeed, R&T activities on detectors as well as several balloon flights (Archeops mission) paved the way in the 90's to the large French involvement in the Planck payload (responsibility of the HFI instrument). After this "ultimate CMB mission" to extract all information from the temperature anisotropies, the next logical step seems to address the B modes of the polarisation anisotropies which are linked to the gravitational waves which inflation should have generated soon after the Big Bang. This will allow building a much deeper understanding of the early Universe, but severe technical challenges are then to be faced. To evaluate the feasibility of such a mission, CNES and the national scientific community performed in 2005/2006 an assessment study on the SAMPAN mission (see presentation of F. Bouchet) and I now recall some of the main findings of this study.

The needed sensitivity implies a very large number of detectors (several thousands) operating at very low temperature (0.1 K), since current detectors (e.g. on Planck) are already close to the photon noise limit. In addition, the separation of the cosmological signal from the foreground emissions leads to make the measurements at several frequencies (a minimum of 4 were considered in Sampan). Finally, the control of the systematics effects on the measurements leads to define a complex scanning strategy as well as a complex spacecraft design. As a result of our studies, it appears however that such a challenging mission may be developed with the existing and next to come technologies but its overall cost (~ 1/2 billion €) is largely above national or bilateral resources. Thus the natural development frame for this mission is clearly the ESA scientific program and this is why it has been recommended to the French Sampan team to discuss with other European laboratories to prepare a joint proposal for the ESA call for the new Cosmic Vision missions. This workshop is a perfect opportunity to start these contacts.

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