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Measuring high frequency plasma waves with a wide band search coil magnetometer ; an instrument dedicated to Bepicolombo mission.

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A wide band search coil magnetometer has been designed in the aim of providing very sensitive measurement of magnetic field from few 100mHz to 640kHz. The principle of a conventional search coil is : a magnetic core amplifies external magnetic field, then a voltage is induced on its high turn number winding. Next, a very low noise preamplifier amplifies the induced voltage and finally a flux feedback guaranties a flat transfer function (between output voltage and external magnetic field) on several decades.

However, resonant behaviour of such a sensor, due to simultaneous inductive and capacitive behaviour, makes impossible measurement on more than 3 to 4 frequency decades. Some investigations on resonant behaviour have made possible to incorporate an additional winding designed for high frequency measurement simultaneously with the low frequency one. This extended measurement frequency (6 to 7 frequency decades all together), without an excessive mass & power consumption addition, permits to board it on MMO spacecraft of Bepicolombo mission which aims to investigate Mercury ionised environment. We will present principle of the wide band search coil magnetometer, the main lines of the instrument and performances measured on a first prototype.