LYRA: the Solar VUV radiometer on-board PROBA II

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LYRA (LYman-alpha RAdiometer) is the solar VUV radiometer that will embark in 2006 onboard PROBA II, a technologically oriented ESA micro-mission. It is being designed, manufactured and calibrated by a Belgian-Swiss-German consortium. Absolute measurements of the solar VUV irradiance are reputed to be difficult. They always require a space-born instrument with special schemes to guarantee its calibration reliability, particularly important for the analysis of the solar influence on the Earth atmosphere and climate. The VUV irradiance variability is currently known in a too piecemeal way to be confronted with physical models. LYRA will partly fill the anticipated gaps by monitoring the solar flux in four selected UV passbands. The channels have been chosen for their relevance to Aeronomy, Space Weather and Solar Physics: 1/ Lyman-alpha (115-125 nm), 2/ the 200-220 nm range (interference filters are used for the first two passbands), and 3/ Al filter channels (17-70 nm). The last channels consist of 4/ MgF2 windows (120-220 nm), additionally motivated by technological objectives. The stability of the detectors in these wavelength ranges is crucial for LYRA, which will benefit from innovative diamond devices. This wide bandgap material makes the sensors radiation-hard and "solar-blind"; this allows suppressing some of the usual filters, that block the unwanted visible, but attenuate seriously the desired UV radiation. Their removal will hence increase the signal to noise. A triple redundancy strategy, together with visible and UV calibration LEDs will aim at maximizing the precision and the stability of the measurements. LYRA's cadence will be adaptive. The acquisition frequency will adapt autonomously to rapid variations during solar flares or eclipses. The instrument and the software are such that LYRA will be a innovative solar monitoring tool for operational space weather nowcasting. For budget reasons however, PROBA II is planned to be launched in a noon-midnight LEO orbit. This would mean that LYRA will be in the shadow of the Earth for a third of every orbit, which would severely limit its use for space weather operations. Therefore we are suggesting to change the orbit to a permanent Sun observing trajectory.