*Charge E. The long-term ALMA Development Plan*

The ESAC reviewed the current activities related to the ALMA Development Plan. The ASAC has lead the formation of a working group, involving members of the community, and which includes two ESAC members, that will now consider possible enhancements for ALMA, in the 2020 time-frame. Initial telecons were performed by this working group, and several ideas are currently being considered. In this context the ESAC was briefed on the current status of the ALMA enhancement EC-FP6 project, by Gie Han Tan, John Richer and Frederic Gueth. This project aims at the development of 6 band-5 cartridges, development of procedures and software for on-the-fly observations, and development of advanced algorithms for Water Vapour Radiometer phase corrections. The project will last until 2010, and will result in significant developments that are prime candidates for implementation with ALMA. One obvious and very attractive example would be extending the band-5 observations to more than 6 antennae. This would be a straightforward development for ALMA, with all R&D activities already performed and the cartridges being ready for production.

The ESAC discussed the science drivers for such extension, and found them to be very appealing. One powerful driver would be the observation of the $H_2O$ 183.3 GHz line towards protoplanetary disks, star forming regions and around AGNs. Due to the high water content of our atmosphere the abundance of this molecule in space can hardly be derived from ground based observations. However, there are a few lines of this species that are collisionally pumped for which the Earth atmosphere is rather transparent. They are the water maser lines at 22, 183 and 325 GHz. Of these, the 183.3 GHz line requires the less stringent physical conditions (it is strong even for temperatures as low as 50K and densities below $10^6$ $cm^{-3}$) to arise, making it the line of choice to understand the chemistry of water in the Universe. If ALMA is fully equipped with the Band 5 receivers, it will bring the possibility to study the spatial distribution of $H_2O$, with the largest angular resolution provided by this interferometer, towards protoplanetary and planetary disks, the innermost zones of evolved stars,high mass star forming regions and the central regions of extragalactic objects.. Another identified driver for a full ALMA band 5 availability would be detecting the strong [CII]158 micron line in galaxies at redshifts z=8-10. This will probably be the only means to determine the redshift of many of the objects in this fundamental redshift range, and would require the sensitivity of the full ALMA array.