Latest results from the PolarquEEEst missions

Marcello Abbrescia on behalf of the EEE Collaboration

This contribution is about the PolarquEEEst missions, which were a series of measurements of the cosmic ray flux performed at the sea level and up to the highest latitudes, well beyond the Polar Article Circle. They started in Summer 2018, when one telescope for cosmic rays was installed on a sailboat leaving from North Iceland, to circumnavigate the Svalbard archipelago and land in Tromsø. They continued with a series of measurements performed using the same detector, which took place first in Italy, and then in Germany, with the goal to measure the dependence of cosmic charged particle rate with latitude. Then, in May 2019, the PolarquEEEst collaboration installed a small a cosmic ray observatory for the detection of secondary cosmic muons at Ny Alesund, at 79N, made of three independent identical detectors positioned a few hundred meters from each other, and synchronized in order to operate together as a network.

This contribution is relevant because it presents a series of measurements of the charged particle rate at the sea level close to the North Pole performed with unprecedented precision, namely better than 1%. It also describes some experimental set-up that are currently being used to obtain a series of additional measurements with could enlarge the validity range of the measurements performed. Also the first long term campaign of measurement of the charged particle rate at 79N is presented.

What have we done? In this talk the detectors used and the measurements collected will be presented in details, together with the analysis performed on the raw data. Also the potentialities of the data taking campaign currently ongoing will be outlined.

What is the result? The measured cosmic rate does not show any evidence of dependence on either the geographic or geomagnetic latitude where it was measured, thus indicating a constant cosmic ray flux in the latitude range between 65 and 80N, within a ± 1% accuracy. This result, obtained at sea level in an almost unmeasured region well beyond the Arctic Circle, confirms the trend already observed in the past, and is consistent with the effects of the Earth magnetic field near the North Pole.