Contribution ID: **259** Type: **not specified**

Study of Vacuum stability and desorption processes at low temperature for various FCC-hh candidate materials.

Tuesday, 10 April 2018 17:59 (1 minute)

One of the many important parameters to be studied and fixed in the design of the FCC-hh is the operational temperature (T) at which the foreseen beam screen should operate. Such choice will necessarily be a compromise between the desire to reduce cooling costs (keeping it at as close as possible to room T) and to have a minimal wall resistivity (keeping it at as low as possible Ts). The final chosen T must than cope with other constrains one being vacuum stability even in case of tiny and unavoidable wall T fluctuations.
The required set up to perform such experiment has been commissioned and tested at LNF. Adsorption and desorption processes versus T variation have been studied for calibration purposes for Ar ices deposited on different materials held at T below 20 K.
We performed a preliminary comparison between Ar ice grown on clean Cu, LHC Cu and on a representative sample belonging to the family of laser treated Cu (LASE). If Ar ice is formed on close to flat surfaces its desorption/adsorption dynamics is dominated by Ar-Ar Van-der-Waals bond strength, so that the Ar desorption occurs at the expected T ˜ 30 K. When such Ar ice is grown onto such a strongly morphologically modified surface, only thick ices behave as expected. At low/intermediate coverages, the Ar desorption takes place in a much vaster and higher T interval. This evidence may suggest a critical dependence of vacuum stability on surface morphology and gas quantity requiring further investigation.

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Session Classification: Poster session

Track Classification: EuroCirCol