



Contribution ID: 217

Type: **Contributed**

Low Energy Electrons Yield of copper as received and after sputtering

Friday 22 June 2018 09:30 (20 minutes)

On the way to High Luminosity LHC the electron cloud build-up has been identified as the main limiting factor. It has been shown that this phenomenon correlates with the secondary electron (SE) yield of the materials used to construct accelerator's vacuum chambers. To this day, different methods have been developed in order to mitigate the electron multiplication process. Currently, there are solutions (e.g., "beam scrubbing", thin-film coatings and laser engineered surfaces structures.) to lower the maximal value of the SE yield well below 1.3. Moreover, it has been observed that the electron cloud formation is influenced by the time spacing between proton bunches. Simulations show that electrons with energies below 10eV are strongly influencing the electron cloud build-up if those low energy electrons are not reabsorbed within the time interval between bunches. We report on preliminary studies of low energy SE yield of polycrystalline copper as received and after sputtering. Moreover, in order to disentangle the various contributions to the electron yield in the low energy regime - where it is known that the yield-response of a material is determined by an interplay between reflectivity and emission of SEs - we investigated also copper single crystals in two different symmetry directions. Here, the role played by the band structure becomes evident. These studies enable to identify the various contributions influencing the yield. Knowledge about microscopic properties of a material are of essential importance to purposely tune a macroscopic surface, thus to achieve a goal-oriented technological performance.

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Session Classification: Vacuum in Accelerators

Track Classification: Vacuum in Accelerators