Contribution ID: **105** Type: **not specified**

Radon reduction and evaluation system for rare search events experiments

Saturday, 14 October 2017 09:10 (15 minutes)

Terrestrial radioactive backgrounds present a continuous challenge to low background experiments. A prototype 222Rn reduction and evaluation system has been constructed where different types of charcoals were investigated to find the most efficient 222Rn adsorbing and 222Rn-free element. Average 222Rn breakthrough times and other adsorbing characteristics were studied in N2, Ar, and Xe carrier gases in the range of the temperatures 295-190 K. While 222Rn breakthrough times in N2 and Ar follow the Arrhenius relationship in the range of 295-253K, this does not seem to be the case for Xe gas at lower temperatures. Due to their low polarizability in the investigated range of temperatures, N2 and Ar have negligible attraction to the charcoal adsorbent used. This requires relatively small amounts of adsorbing material to retain radon until it completely decays away and results in longer breakthrough times. By contrast, Xe atoms almost instantly occupy a large fraction of charcoal adsorption sites resulting in faster breakthrough times for 222Rn. Consequently, significantly larger masses of adsorbent are required to reduce 222Rn. Various types of charcoals that may potentially be rendered almost 222Rn free through chemical purification methods. The experimental method, apparatus, and detailed experimental results, as well as their impact on G3 experiments, will be presented.

Primary author: Dr PUSHKIN, Kirill (University of Michigan)

Presenter: Dr PUSHKIN, Kirill (University of Michigan)

Session Classification: Cryogenic Technologies VII

Track Classification: Noble Liquids