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Radon adsorption in nanoporous carbon materials

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The background from the Radon decay chain is the strongest constraint for many experiments working at low energy and very low counting rate in particle and astroparticle physics. Classically, activated charcoal filters are used to dynamically capture the radon from the air or from the gas of the detectors. The activated charcoal has large effective surface and broad porosity, going from macro to nanopores, and in general is a good adsorptive material. However, the big constraints from futures experiments need ad hoc radon capture filters. The optimal adsorption depends however on the correct pore size, the temperature, pressure, the microscopic structure of the adsorbent and the completion between the different components of the gas. In this context, we have developed at Centre de Physique des Particules de Marseille (CPPM), a test bench to study the radon capture in new and more selective porous materials. Several very interesting results have been already obtained with non-standard commercially available adsorbents like Metal Organic Frame Work (MOF), Carbon Molecular Sieves (CMS), etc. In parallel to this work, and in order to achieve the extremely high radio-purity requirements of our experiments, we are developing in collaboration with the Centre Interdisciplinaire de NAnosciences de Marseille (CINAM) a new research methodology based on dendrimers and their carbonaceous polymeric derivatives. We will present the results obtained up to now and the prospective of our facility.

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