High-scale SEOP 129Xe polarizer for medical studies

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The introduction of hyperpolarized noble gases ^{3}He and ^{129}Xe delivered a great tool for a growing number of applications, ranging from neutron filters [1] to medical imaging [2, 3, 4] and spectroscopy studies. Rising requirements for large volumes of hyperpolarized gases could be realized by efficient polarizers and such as, a novel polarizer for ^{129}Xe presented here. This high-scale production polarizer works based on the Spin Exchange Optical Pumping (SEOP) method for polarizing ^{129}Xe. The specific properties of xenon, mostly arising from the large polarisability of its electron cloud, makes this noble gas a very interesting NMR probe for biological systems [5] and is commonly used in non-invasive lung diagnosis for MRI applications. Three main parts of this polarizer will be presented: the high-power laser system for rubidium optical pumping, the high-volume SEOP cell and the cryogenic accumulation system for hyperpolarized ^{129}Xe. This overview of the motivation and current status of our SEOP polarizer project and research on processes like spin-exchange and relaxation mechanisms are the main topics of this presentation.

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