



Polarean 9800

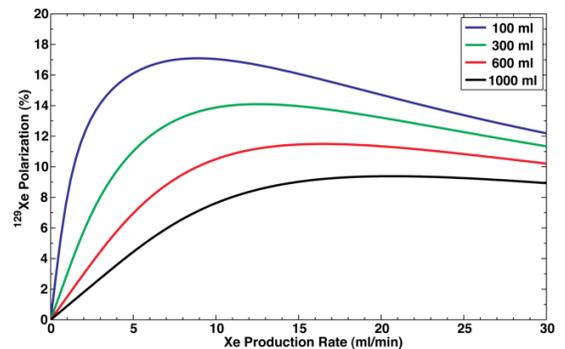
^{129}Xe Hyperpolarizer



The 9800 ^{129}Xe hyperpolarizer provides a routine supply of high-purity, hyperpolarized ^{129}Xe for gas phase magnetic resonance studies. The polarizer is typically installed near the MRI/NMR suite and processes a custom mixture of unpolarized ^{129}Xe , N_2 , and ^4He , into one or more doses of pure hyperpolarized ^{129}Xe that is available for magnetic resonance studies. There is no chemical change associated with hyperpolarization—only nuclear spin alignment and cryogenic extraction of pure xenon. The hyperpolarized ^{129}Xe is then thawed and dispensed into a container or bag. Once dispensed into an appropriate container, and maintained within a modest holding magnetic field, the polarization relaxes with a T_1 of 1-2 hr.

System Overview and Specifications

The 9800 Xenon Hyperpolarization system can be operated on site by personnel who have undergone appropriate training. Polarization levels range from 7-15% depending on the volume of xenon processed. The system operates as a Class I laser, and thus requires no laser protective eyewear during normal operation.



Note: The 9800 Xenon Hyperpolarization system is designed for research use. If the system is used to produce hyperpolarized ^{129}Xe for human inhalation, all applicable institutional and federal approvals must be obtained.

System Components

- Polarizer cart, compatible with either ^3He or ^{129}Xe cartridges
- ^{129}Xe hyperpolarization cartridge
- 795nm optical pumping laser in Class I housing
- Circular polarizing and beam collimating optics
- Mass flow and pressure readings
- High-field cryogenic accumulation area
- Vacuum Pump/Purge to prepare delivery vessel
- Shielded optical oven with temperature control
- Flow-through optical cell containing Rb metal
- Laser Transmission and Spectral Diagnostics
- Safety Interlocks
- Power Distribution

Safety Features

- Filtered power distribution
- Air flow interlocks
- Interlocked protective laser housing for Class I operation
- CE Mark, UL and CSA approval
- DOT approved shipping of replacement optical cells

Optional Equipment and Services

- Polarization measurement station with absolute calibration for ^3He and ^{129}Xe
- ^{129}Xe cylinder manifold for connecting xenon mixture, UHP N_2 , and commercial N_2 tanks.
- ^3He hyperpolarization cartridge
- Dose mixing syringes
- Thermal QA phantoms
- Thermal ^3He QA phantom
- On-site installation and training
- Training services at Polarean
- Regulatory affairs support

Polarizer Dimensions

- 170cm L x 60cm W x 160cm H (65" L x 24" W x 60" H)

Laboratory Space Requirements

- Controlled space capable of temporary Class IV laser operations
- Minimum room dimensions:
 - width 120" (3m)
 - depth 84" (2m)
 - height 84" (2m)
- Ferrous materials to be at least 3' (1m) away from the polarizer
- Local ambient magnetic field preferably less than 1 Gauss

Electrical Requirements

- 3 phase 208 V, 47-63 Hz, 20 A per phase
- Power outlet: US NEMA L21-30R
- Lockable isolate box

Compressed Air

- 20 psig (1.5 bar) minimum pressure
- 4 standard cubic feet per minute (110 L/min) minimal flow
- 0.01% water maximal content

Environmental Requirements

- 5 kW maximal power load
- Room temperature between 68-75 °F (20-24 °C)
- Dedicated temperature control

Supplies and Consumables

- External ^{129}Xe - ^4He - N_2 tank
- External UHP N_2 tank
- External commercial N_2 tank
- Liquid nitrogen
- Dose delivery bags