HIGH-SPEED, HIGH-MEMORY NMR SPECTROMETER AND HYPERPOLARIZER

Tech ID: 33543 / UC Case 2024-124-0

PATENT STATUS

Patent Pending

BRIEF DESCRIPTION

Recent advancements in nuclear magnetic resonance (NMR) spectroscopy have underscored the need for novel instrumentation, but current commercial instrumentation performs well primarily for pre-existing, mainstream applications. Modalities involving, in particular, integrated electron-nuclear spin control, dynamic nuclear polarization (DNP), and non-traditional NMR pulse sequences would benefit greatly from more flexible and capable hardware and software. Advances in these areas would allow many innovative NMR methodologies to reach the market in the coming years.

To address this opportunity, UC Berkeley researchers have developed a novel high-speed, high-memory NMR spectrometer and hyperpolarizer. The device is compact, rack-mountable and cost-effective compared to existing spectrometers. Furthermore, the spectrometer features robust, high-speed NMR transmit and receive functions, synthesizing and receiving signals at the Larmor frequency and up to 2.7GHz. The spectrometer features on-board, phase-sensitive detection and windowed acquisition that can be carried out over extended periods and across millions of pulses. These and additional features are tailored for integrated electron-nuclear spin control and DNP. The invented spectrometer/hyperpolarizer opens up new avenues for NMR pulse control and DNP, including closed-loop feedback control, electron decoupling, 3D spin tracking, and potential applications in quantum sensing.

SUGGESTED USES

- Nuclear magnetic resonance (NMR) spectroscopy
- Electron-nuclear spin control and dynamic nuclear polarization (DNP)
- Non-traditional NMR pulse sequences

ADVANTAGES

- Robust, high-speed NMR transmit and receive functions, including at the Larmor frequency and up to 2.7 GHz; substantial memory capacity and data transfer speeds
- Compact, rack-mountable and cost-effective

RELATED MATERIALS

CONTACT

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INVENTORS

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OTHER INFORMATION

CATEGORIZED AS

- **Biotechnology**
  - Health
  - Other
- **Materials & Chemicals**
  - Chemicals
  - Other
- **Medical**
  - Devices
  - Diagnostics
  - Imaging
  - New Chemical Entities, Drug Leads
  - Other
  - Research Tools
  - Screening
- **Research Tools**
  - Other
  - Screening Assays
- **Security and Defense**
  - Other

- » Screening/Imaging
- » **Sensors & Instrumentation**
  - » Analytical
  - » Biosensors
  - » Environmental Sensors
  - » Medical
  - » Other
  - » Physical Measurement
  - » Process Control
  - » Scientific/Research

RELATED CASES

2024-124-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ Multi-channel ZULF NMR Spectrometer Using Optically Pumped Magnetometers
- ▶ High-Precision Chemical Quantum Sensing In Flowing Monodisperse Microdroplets

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