



# PHOENIX **NMR** DOES MAS-DNP

Elevate Your Science with WB MAS-DNP NMR Probes

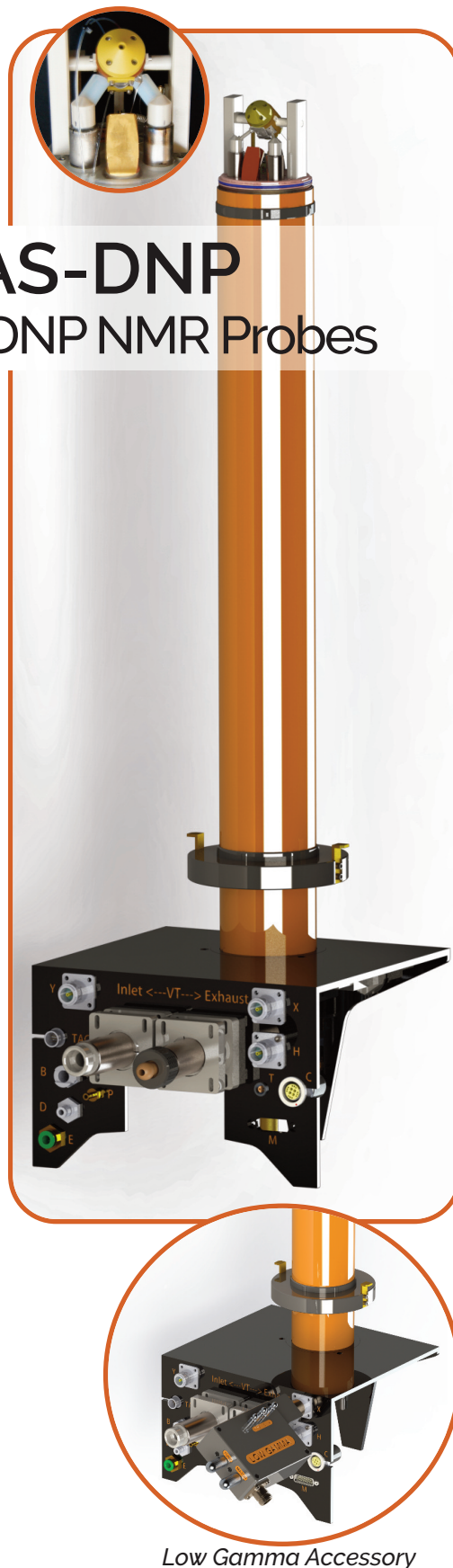
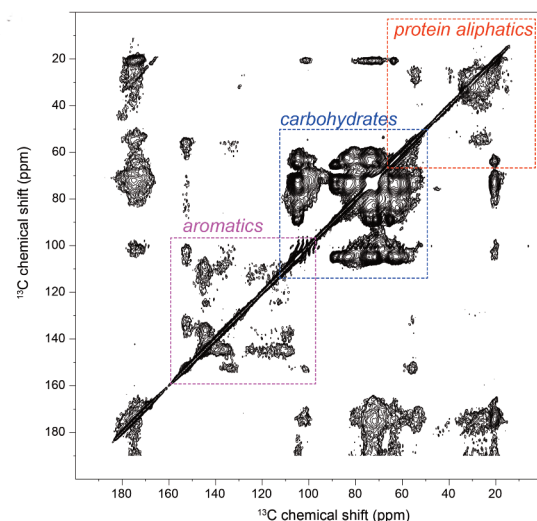
## Features of the Phoenix DNP Innovation

- Combine MAS-DNP with HXY and HX probe configurations
- Operating set-temperature range = 90 - 373 K
- 2.5 mm module spins up to MASS = 25 kHz at T = 90 K
- Insert and eject samples in-situ at cold and warm temperatures
- Modest up-front costs. Compare!
- Unique VT design minimizes cryogen use
- Available for wide-bore 9.4T and 14.1T systems
- Add just a Phoenix WB MAS-DNP Probe to expand a current DNP System
- Pair the Phoenix WB MAS-DNP probe and controllers with Bridge12 Technologies components for a complete DNP accessory
- Optional Simultaneous H/F operation
- Optional Low-gamma accessory

## DNP-Enhanced $^{13}\text{C}$ - $^{13}\text{C}$ Correlation

$^{13}\text{C}$ - $^{13}\text{C}$  2D correlation of  $^{13}\text{C}$  labeled intact plant stem (Sample and Data by Tuo Wang<sup>2</sup>). Data acquired on the 395 GHz / 600 MHz DNP NMR system at the National High Magnetic Field Laboratory in Tallahassee, FL, in collaboration with Frederic Mentink-Vigier<sup>1</sup>. MASS = 22 kHz; Sample T ~ 140 K (run at a conservative 20 lpm VT flow); DNP Enhancement = 8:1.

<sup>1</sup> Frederic Mentink-Vigier, National High Magnetic Field Laboratory, Tallahassee, Florida 32310, <sup>2</sup> Tuo Wang, Department of Chemistry, Louisiana State University, Baton Rouge, Louisiana 70803.



Low Gamma Accessory



# PHOENIX **NMR**

Elevating your science

**IMPLEMENTING SUPERIOR SSNMR CAPABILITIES**  
**ON YOUR DEDICATED SOLIDS SYSTEM**  
**OR ADDED TO YOUR EXISTING LIQUIDS NMR SYSTEM**



**PHOENIX **NMR****

[www.PhoenixNMR.com](http://www.PhoenixNMR.com)

510 E. 5th Street ~ Loveland, CO 80537  
 Tel: (970) 776-9658

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## Regional Sales Representatives

### Europe

TalaveraScience  
 Paul Jonsen  
[pauljonsen@talaverascience.com](mailto:pauljonsen@talaverascience.com)

### Japan

L.A. Systems Inc.  
 Yoshihisa Kitamura  
[kitamura@las.jp](mailto:kitamura@las.jp)

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 Yoshihisa Kitamura  
[kitamura@las.jp](mailto:kitamura@las.jp)

TAKING PROBE DESIGN  
TO NEW HEIGHTS

The Phoenix Premium HXY Probe

PhoenixNMR provides a highly innovative line of Solid State NMR probes packed with benefits designed to keep your focus on your science, not on your instrumentation. We implement features that provide modularity and performance, and eliminate condensation and frost build-up when operating at sample temperatures below room temperature. Our modular probe design allows greater experimental flexibility with less expense. We are confident that you will find PhoenixNMR's products truly elevate your science. Let us take a moment to describe its most innovative attribute: **modularity**.

A HIGHLY-FLEXIBLE MODULAR DESIGN.

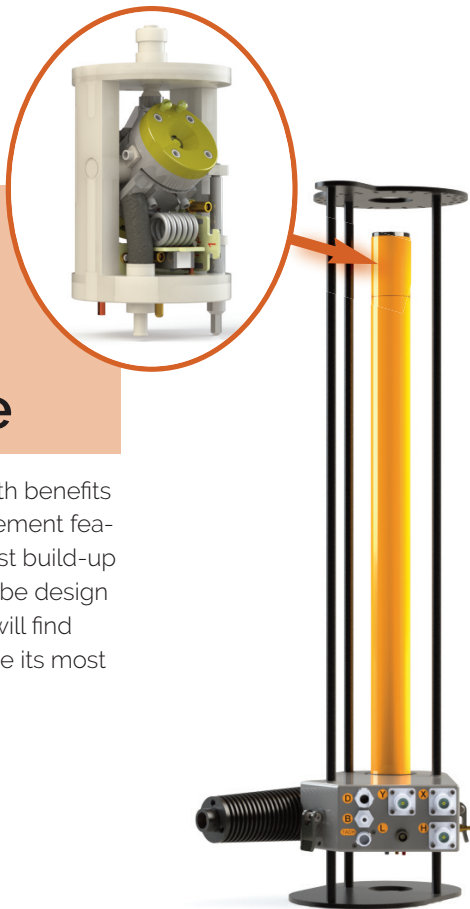
What does modularity mean? It means that when you purchase a new PhoenixNMR probe today, you are actually purchasing two components: a Probe Body and a Probe Head.

- THE PROBE BODY houses all elements common to every PhoenixNMR probe, including:
- Frost and condensation free Variable Temperature system
  - H to F or H and F high band tuning assembly
  - Sample spin speed tachometer
  - RF connectors
  - High efficiency broadband high power tuning tubes
  - Low Gamma Accessory to extend tuning to <sup>4</sup>K or lower
  - Standard Broadband X and Y channels: <sup>31</sup>P to <sup>15</sup>N and <sup>23</sup>Na to <sup>15</sup>N
  - Optional: simultaneously pulse/observe Near-Band Nuclei, e.g., <sup>17</sup>O/<sup>2</sup>H

- THE PROBE HEAD, on the other hand, houses all:
- Sample size-specific and channel configuration-specific items
  - Band select elements (Trap and Series Capacitor)
  - Magic Angle adjust mechanism and Spin speed fiber optics
  - The spinning module
  - Variable temperature isolation shells

ONE PROBE / MULTIPLE SPINNING MODULES

When a PhoenixNMR Probe Body and Head are combined, they complete a probe capable of 1 to 4 channel operation, the details of which are governed only by the initial selection of the Probe Body and Probe Head module and your imagination. This gives you unmatched flexibility in the world of NMR probes because, at any time in the future, instead of purchasing a completely new probe, you only need to purchase a new probe head to expand your capability. This modularity provides you with the opportunity to expand your future research at about half the cost.



Exchange Probe Heads for the HXY Probe body in your lab using one small screwdriver, and be ready for an entirely new suite of experiments, with no sacrifice in spinning, RF, or VT performance, in less than 30 minutes.

PROBE COMPARISON:

Option	Phoenix HXY Premium	Phoenix HX
HXY, FXY	✓	-
HFX	✓	-
HX, FX	✓	✓
HFX	✓	✓
LOW GAMMA (add-on)	✓	✓
CLOSELY-SPACED $\gamma$ 's <sup>1</sup> e.g., <sup>2</sup> H/ <sup>17</sup> O (add-on)	✓	-
1.2, 1.6, 2.5, 3.2, 4, 5, 6 mm	✓	✓
STATIC	✓	✓
FREQUENCY	400 to 900 MHz	300 to 700 MHz
VT RANGE <sup>2</sup>	-125°C to +125°C	-75°C to +100°C
LOW <sup>1</sup> H or <sup>19</sup> F	✓	✓
INTERCHANGEABLE PROBE HEAD	✓	-

Take Control of Your Spinning with the  
PMAS SPEED CONTROLLER

- This pneumatic control system is compatible with virtually all commercial spinning systems and probes. Upgrade your current speed control system, or bundle this with a PhoenixNMR H(F)X probe to add affordable SSNMR capability to a liquids NMR system. Features include:
- Touch-screen interface
  - Speed detection beyond 180 kHz
  - Auto-calibration for unknown modules or extreme conditions
  - Ability to accommodate unlimited number of spin profiles
  - Simple user updates for new module profiles
  - PID teaching mode for non-Phoenix probes
  - Bearing and drive automation
  - Easy, instant switching between automated and manual spinning modes while spinning
  - Time stamp data logging for all parameters

Extend your Range with the  
LOW GAMMA  
PROBE ACCESSORY

- PhoenixNMR HXY, HX, and MAS-DNP probes can all be tuned as low as 8 MHz with this accessory.
- With the low-gamma accessory in place on one channels, other probe channels continue to function. (Drawing above shows the accessory blocking the X- and H-channel RF connectors, but the accessory can be rotated to allow operation of those channels.)
  - Convenient design provides quick and efficient switching between normal probe tuning range and the low-gamma tuning range.
  - \*Smaller rotor modules and probes designed to work at high magnetic fields may not tune as low as 8 MHz. Request a quote for details.

AFFORDABLE SSNMR  
PLUS PERFORMANCE

The Phoenix HX Probe

The Phoenix HX probe is available in rotor sizes from 1.2mm up to 6mm for 300MHz-700MHz performance! This affordable probe, which is about half the cost of the fully featured HXY probe, makes it easy to add solids to any existing standard bore liquids NMR system by bundling with a PMAS speed controller from PhoenixNMR.

- Proton channel tunes <sup>1</sup>H to <sup>19</sup>F with an optional simultaneous H&F capability
- X channel tunes <sup>31</sup>P to <sup>15</sup>N
- Fits most NB, SB, MB, or WB Magnets
- Specs available for High-power and 100-W Amplifiers
- Utilizes a similar VT delivery system as the Phoenix HXY Premium probe to give minimal temperature offset and sample gradient
- Compatible with JEOL, Bruker, Varian/Agilent, and Tecmag NMR systems

