DOTY SCIENTIFIC

The Resonator

NMR - MRI Newsletter Spring 2015

Dear Colleague,

Many of you need NMR probes and MRI coils for Agilent systems. Doty Scientific has been making high performance NMR probes and MRI coils over 30 years that are compatible with Agilent, Bruker, JEOL, Tecmag, and other systems.

At conferences this spring and summer, we'll be discussing ways to make DNP affordable. We'll be sharing information on our CryoMAS-DNP probe; our new Static DNP probe (see below); and a wide range of NMR probes and MRI imaging coils. Let's talk about your interests.

David and Judy Doty

Upcoming Conferences

SUN **19** APR 2015 - FRI **24** APR 2015

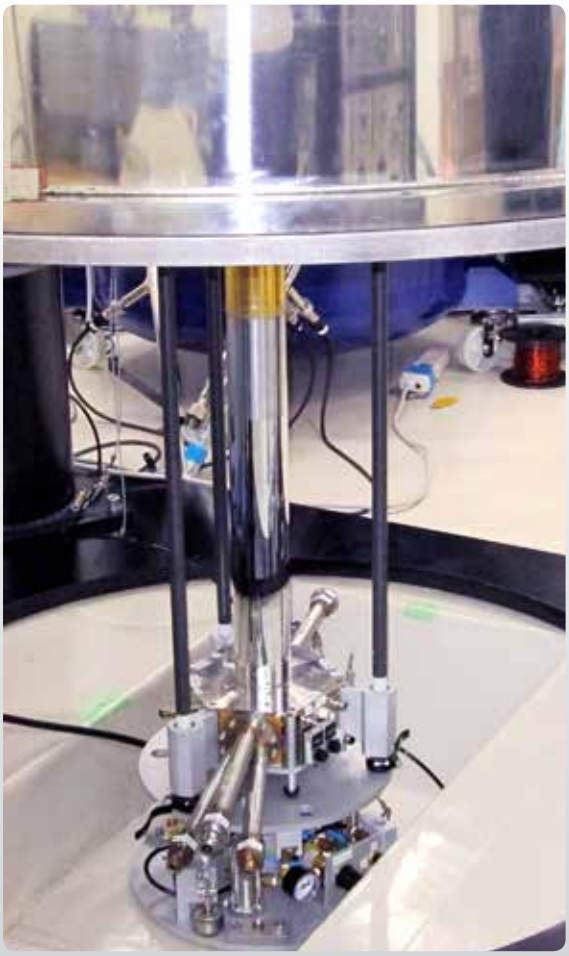
ENC

Asilomar Conference Center
Pacific Grove, California, USA
www.enc-conference.org
Visit our ENC Hospitality Suite 'Toyon'

SUN **31** MAY 2015 - SUN **5** JUNE 2015

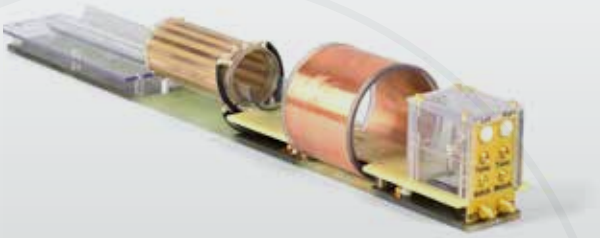
ISMRM

Metro Ontario Convention Center
Toronto, Ontario, Canada
www.ismrm.org/15
Visit our Booth # 708



CryoMAS™ DNP Probe

MRI Coils	NMR Probes
Small Animal Imaging Platforms	CryoMAS DNP Probes
RF Imaging Modules	Static DNP Probes
Surface Coils	Solids / Liquids MAS Probes
	Magic Angle Gradient Probes
	PFG / Diffusion Probes
	Liquids HR Probes
	High Temperature Probes



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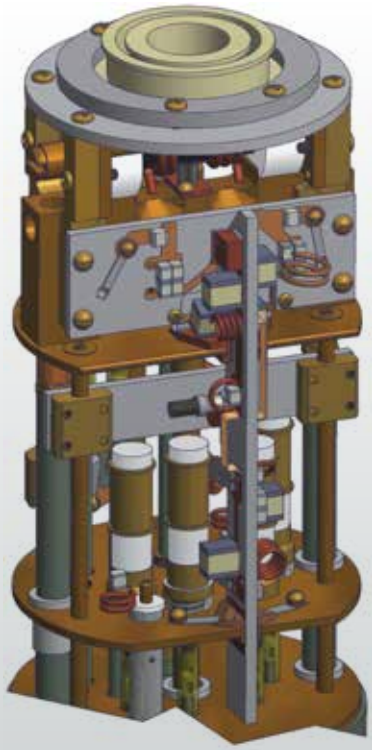
Static-DNP Probe

Making it possible for NMR groups to bring static H/X/Y/e$^-$ DNP into their labs

For both solids and liquids at high fields

The estimated price including the solid-state μw source, the Doty DNP probe, waveguides, and transitions, for 7 T to 11.7 T, is anticipated to be in the range of $180K to $220K

Adequate solid-state μw sources are available up to 11.7 T



H/X/Y/e- Static DNP Probe

There has been a lot of excitement about MAS-DNP over the past four years (e.g. its potential for two orders of magnitude increase in S/N), but the cost has appeared to be well beyond what most NMR labs could begin to consider – due to the need for a special magnet with superconducting sweep coils and an expensive gyrotron. However, you will probably be surprised to learn that usually less than 0.1% of the microwave (μw) power from the gyrotron ends up being dissipated in the sample by mechanisms that represent fundamental limitations. This suggests that in principle it should be possible to do DNP (at the same temperature, 90-150 K) with ~0.1% of the amount of μw power that has been thought necessary. If true, gyrotrons would not be needed. Low-cost solid-state sources could be used, and their bandwidth is more than sufficient to eliminate the need for superconducting sweep coils and a new NMR magnet.

We have been hard at work for two years toward this vision and have made amazing progress. Our latest (fully detailed) simulations are saying our first-generation cavity for static (non spinning) H/X/Y/e$^-$ DNP at 7T will be about two orders of magnitude more efficient than what has previously been seen in high-field DNP probes. This revolutionary advance (patent pending) will make it possible for all NMR labs to begin applying high field H/X/Y/e$^-$ static DNP to their solids-NMR problems, such as in structure-function studies of membrane proteins.

And what about the potential for similar efficiency breakthroughs in cavities compatible with MAS-DNP? They're coming too – within about two years. Come by our 'Toyon' ENC Hospitality Suite to learn more, and get in the queue for more than ice cream – the next big wave in NMR !

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