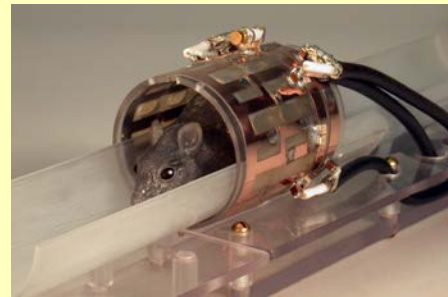


Doty MRI

Small Animal Imaging Platform



**Litzcage Coil
on Small Animal Platform**



Doty Scientific 2012

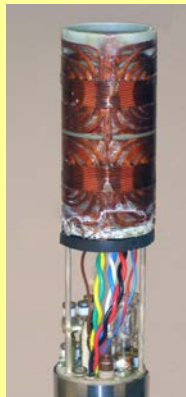
RF Imaging Modules



Surface Coils



**Vertical
Bore
Imaging
Probe**



Doty MRI

March 2012

TABLE OF CONTENTS

	PAGE
Small-Animal Imaging Platform (<i>With Litz or Litzcage RF</i>) -----	1
Simple-tune Small-Animal RF <i>Litz</i> or <i>Litzcage</i> Modules -----	3
Surface Coils for High-Field MRI/NMR -----	5
Vertical Bore Imaging, 3 Axis Gradient Probes -----	6
Gradient Probes for High Field Vertical Bore MRI Microscopy	
Small MRI Three Axis Gradient Coils -----	7
Human Knee, Other Extremities, or Primate Head <i>RF</i> Imaging Coils -----	8
Simple-tune <i>Litz</i> and <i>Litzcage RF</i> Coils up to 750 MHz -----	9
Ordering Information -----	10

Catalog information may be changed at any time.

Download the most recent catalog on our website www.dotynmr.com.

www.dotynmr.com

Simple-tune RF Small-Animal Imaging Platform

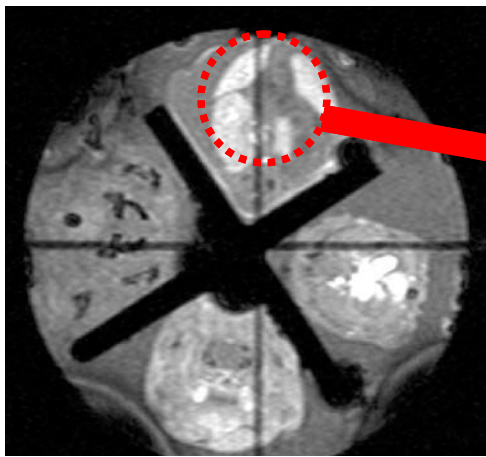
Prompt delivery of standard sizes.



Shown with CP *Litzcage* rf coil (removable rf shield not shown.) All standard sizes available to 500 MHz. Standard Coil Sizes 25 mm, 38 mm, 50 mm, 63 mm diameter.

Mouse Embryo – 50 micron isotropic resolution

Imaged @ 7T on a Doty Small Animal Imaging Platform – CP *Litzcage* coil with ID=25 mm and Length=22 mm



Versatile, Open, Robust, Economical

The CP *Litzcage* is semi-open and mounted on an almost transparent, short coil form. The removable rf shield tube allows for full access to the coil area.

The CP *Litzcage* rf coil has SNR typically 15% higher than that of conventional CP birdcages of similar dimensions. B_1 homogeneity is typically 10-30% better, and the coil has superior B_0 homogeneity.

Easy tuning

A unique symmetrizing circuit ensures the coil is easily tuned and matched to the full range of samples with negligible loss in efficiency, channel separation, or symmetry. Tuning range is an order of magnitude greater than with conventional birdcages and tuning methods.

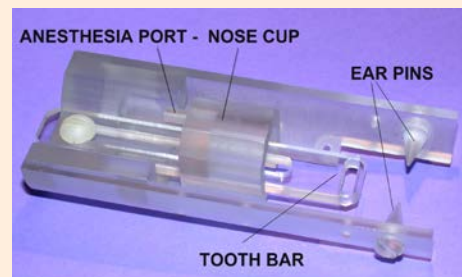
Custom Coils Also Available

Single-tuned and double-tuned *Litz* coils can be used with the platform but they are less “open”. The *Litz* coil is mounted on an opaque substrate whereas the *Litzcage* is mounted on a semi-transparent form. The extra length of the *Litz* coil also makes access more limited.

[For more information on Litz or Litzcage coils, see page 9.](#)

Images courtesy of: Youssef Zaim Wadghiri, Amanda Schneider, Emily N. Gray, Orlando Aristizabal, Daniel H. Turnbull and David Gutstein - New York University

An adjustable head-holder is available for 38 mm coils. Equipped with an adjustable tooth bar and variable depth ear pins (which gently insert into the ear canals) adjustments are simple – yet the result is gentle, secure, immobilization of the head. Finally, the nose cup can be slid over the nose and attached to the anesthesia line.

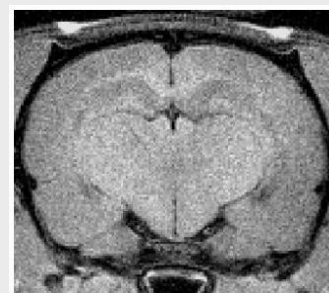


25 mm ID Litzcage on Small-Animal ¹H Imaging Platform					
Coil Length mm	Removable Shield Diameter cm	¹ H MHz	τ_{90} , μ S	Square pulse, Total Power, W	
				Unloaded	Heavy Load*
22	10	200	22	40	50
54	10	200	56	12	26
22	10	300	34	24	36
54	10	300	42	28	90
22	10	400	24	60	108
54	10	400	56	22	100
22	10	500	28	48	100
54	10	500	70	20	110

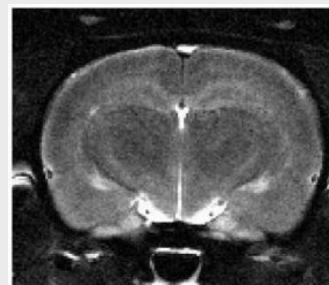
38 mm ID Litzcage on Small-Animal ¹H Imaging Platform					
Coil Length mm	Removable Shield Diameter cm	¹ H MHz	τ_{90} , μ S	Square pulse, Total Power, W	
				Unloaded	Heavy Load*
33	10	200	48	22	35
80	10	200	60	24	110
33	10	300	38	44	110
80	10	300	90	18	140
33	10	400	50	34	110
80	10	400	95	22	200
33	10	500	62	28	100
80	10	500	118	20	180

50 mm ID Litzcage on Small-Animal ¹H Imaging Platform					
Coil Length mm	Removable Shield Diameter cm	¹ H MHz	τ_{90} , μ S	Square pulse, Total Power, W	
				Unloaded	Heavy Load*
36	10	200	26	120	250
108	10	200	78	34	300
36	10	300	38	80	250
108	10	300	115	26	330
36	10	400	52	60	240
108	10	400	122	35	450
36	10	500	52	82	300
108	10	500	154	30	400

63 mm ID Litzcage on Small-Animal ¹H Imaging Platform					
Coil Length mm	Removable Shield Diameter cm	¹ H MHz	τ_{90} , μ S	Square pulse, Total Power, W	
				Unloaded	Heavy Load*
55	12	200	50	75	300
130	12	200	118	34	420
55	12	300	75	52	300
130	12	300	142	35	550
55	12	400	80	58	450
130	12	400	190	32	500
55	12	500	100	52	320
130	12	500	236	28	400



T1 Rat Brain



T2 Rat Brain



T2 Rat Head

These rat brain images were acquired using a 38 mm *Litzcage* at 200 MHz (on a Doty Small Animal Imaging Platform).

The animal was concurrently monitored with scalp EEG after a neuro-surgical procedure.

Image courtesy of:
Dr. Joel Garbow and
Dr. John Zempel,
Washington University,
St. Louis, Missouri.

*Note: A heavy load is a cylinder of 100 mM saline, 75% of coil ID, full rung length.

Simple-tune Small-Animal RF Litz or Litzcage Modules

MRI coils with best sensitivity, homogeneity, and convenience.

With rf coils, the most important criteria usually are S/N, B₁ homogeneity, and reliability. For S/N, simply check the 90° pulse spec. Regardless of whether it's single or double resonance, shielded or unshielded, linear or circular polarization, short or long, surface or volume, one simple relationship always holds for a given voxel size and other conditions:

$$S / N \propto (\tau_{90} \sqrt{P})^{-1}$$

where τ_{90} is the 90° pulse length (we specify for a hard pulse) and P is the transmitter power. Many of the smaller coils listed in the tables have S/N better by factors of 1.5 to 3 than published birdcages of similar size and tuning.



Doty RF *Litz* or *Litzcage* Coil Modules

Easy tuning

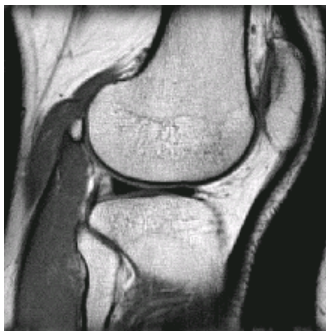
Doty *Litz* and *Litzcage* coils are easily tuned and matched to the full range of samples with negligible loss in efficiency, channel separation, or symmetry. Tuning range is an order of magnitude greater than with conventional coils and tuning methods. Do you have difficulty matching and tuning with certain samples? Are you tired of tweaking numerous adjustments to try to get acceptable B₁ homogeneity with your samples? Does your τ_{90} drop by less than a factor of two (at constant power) when your sample diameter drops by a factor of 2? If you answered yes to any of the above, a Doty *Litz* or *Litzcage* coil could improve your results.

Versatile, Robust Design

In Doty imaging modules, the rf *Litz* or *Litzcage* coils are enclosed in the rf shield and packaged in an integrated aesthetic cover. Coil dimensions can be customized to your specifications.

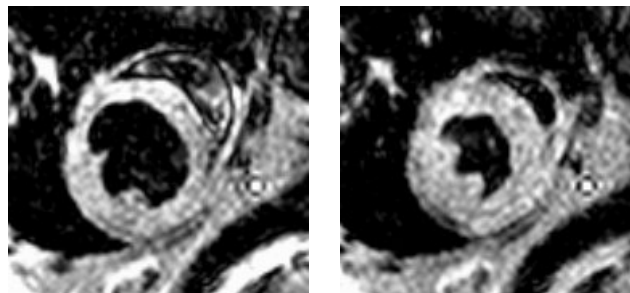
Exceptional Sensitivity

The linear *Litz* or CP (circular polarization) quadrature *Litzcage* coils have SNR 10-15% higher than with conventional linear or quadrature birdcages of similar dimensions – and often much better. The B₁ homogeneity is 10-30% better and the coils have improved B₀ homogeneity. Simple-tune *Litz* coils can be easily double-tuned. With all the improvements, customers are usually surprised that there is also usually a substantial cost advantage in choosing Doty coils.



T2 Adult Knee,
Image at 3T in a 16 cm
Doty *Litz* coil.

Courtesy of Qing Yang, Ph.D.
Hershey Medical Center, PA.



Beating Mouse Heart
Stills from FLASH images
at 4.7 T in a 2.4 cm Doty *Litz* coil.

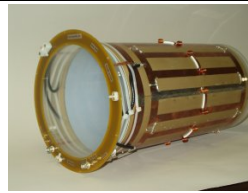
Courtesy of: Frederick H. Epstein, Ph.D., Brent A.
French, Ph.D., and Stuart S. Berr, Ph.D., Depts. of Radi-
ology and Biomedical Engineering, Univ. of Virginia.



5 year old's Knee Image
Acquired in a 120 mm ID
Doty *Litz* Coil at 125 MHz.

Courtesy of:
Bernard Dardzinski, Ph.D.,
Children's Hospital Medical
Center, Univ. of Cincinnati.

**Small Animal Modules
Typical RF Litzcage Coil Specifications
CP(Circular Polarization) Quadrature**



Clear I.D. mm	Coil Rung Length	Shield Diameter	¹ H MHz	τ ₉₀ , μs	Square pulse, Power, W	
					Light Load (30 mM saline 75% diameter)	Heavy Load (100 mM saline 75% diameter)
18	25	37	600	25	45	100
25	22	52	500	25	50	120
38	33	80	500	60	25	100
50	65	80	500	90	50	250
63	55	94	500	100	60	250
100	85	150	300	120	100	400
200	250	250	200	500	200	700

Mouse Brain Images

This T2 spin-echo experiment on a live mouse brain using a 2 cm linear Litz coil in a 4.7 T horizontal magnet demonstrated substantially better B₁ homogeneity and better S/N than a quadrature birdcage of similar dimensions. The Litz coil easily tuned and matched to any load in less than a minute.

Images Courtesy of Joel R. Garbow, Ph.D. Washington University, St. Louis, Missouri, USA.



**Small Animal Modules
Typical Double-tuned RF Litz Coil Specifications**

Clear I.D. mm	Shield Dia. mm	Tuning	¹ H MHz	For ¹ H			For X= ³¹ P			Linear RF Litz Coil
				t ₉₀ (μs)	LL Power (W)	HL Power (W)	t ₉₀ (μs)	LL Power (W)	HL Power (W)	
15	50	¹ H/X	500	23	26	31	34	24	28	
34	72	¹ H - ¹⁹ F	200	26	26	80				
34	79	¹ H/X	500	38	68	170	65	50	110	
62	94	¹ H - ¹⁹ F	80	17	300	550	--	--	--	
100	150	¹ H - ¹⁹ F	128	65	150	760	--	--	--	
100	150	¹ H/X	200	110	120	510	220	50	180	
130	200	¹ H/X	170	150	120	700	310	50	240	
140	210	¹ H/X	128	130	140	700	275	55	240	

For the above coils, the length of the homogeneous region is 80% of the coil ID. Coils with a multi-X channel normally tune ³¹P through ¹³C simply by changing plug-in capacitors. A "light load" is a spherical 30 mM saline sample of diameter 75% of the coil ID. A "heavy load" is a cylindrical 100 mM saline sample of diameter 75% of the coil ID and length extending well beyond the homogeneous region. All coils feature simple tuning, highest B₁ homogeneity, an external rf shield, and susceptibility matching near the sample region. They are resistant to mechanical shock, over-power, and moisture.

LL: Refers to a light load

HL: Refers to a heavy load

[For more information on Litz or Litzcage coils, see page 9.](#)

Surface Coils for High-Field MRI / NMR








Numerically optimized surface coils Up to twice the S/N



- Standard coil diameters include 8, 12, 16, and 24 mm. Other sizes are available on special order.

- Doty surface coils feature conductor geometries optimized for best sensitivity and B_1 homogeneity with biological samples.
- Non-magnetic sealed tuning capacitors mounted adjacent to the coil on a low-loss dielectric substrate - either polyimide or Teflon.
- Fitted with double-shielded flexible rf line (Teflon or polyethylene) with BNC connector.
- Passive (or active) detuning is available for homonuclear experiments using a volume transmit coil.
- Double-tuned surface coils are also available.
- Coils can be ordered covered or uncovered.
- **A remote Coil Matching Network (RCMN) is required to use the surface coil.** The RCMN (which functions over a range of frequencies) can often be used for several coils.

Specify type, diameter, frequencies, and dielectric materials. Balanced circuits are used except for small coils at low frequencies. The prices shown are typical for fd (frequency \times diameter) of 7 MHz \bullet m or less, as for example, 24 mm @ 300 MHz. For fd greater than 7 or for non-standard sizes, prices are higher.

Part # & Price US\$	SURFACE COILS	 		
#99657 \$2530	Single-tuned coil For transmit-receive with detuned volume coil.		Part # & Price US\$	REMOTE COIL MATCHING NETWORKS and DETUNING DRIVERS
#99656 \$3050	Single-tuned, passively detuned For receive only with separate transmit coil.		#99648 \$1325	Remote coil matching network Allows remote impedance matching and limited (2%) frequency tuning of surface coils. Specify high-range (above 200MHz), mid-range , or low range (below 80MHz).
#99610 \$4025	Single-tuned, actively detuned		#99499 \$1955	Remote coil matching network for actively detuned coils
#99652 \$6325	Double-tuned single-loop For transmit-receive and heteronuclear decoupling in small coils at well spaced frequencies.		#97477 \$1725	Detune Driver for surface coils (or volume coils). For driving detune circuit: accepts TTL pulse. (Output ± 15 V)
#99651 \$7245	Double-tuned loop/butterfly For transmit-receive and heteronuclear decoupling, for close resonances and larger coils.		#95477 \$2875	Dual Channel Detune Driver For driving detune circuit of 2 coils (surface and/or volume) simultaneously. Accepts TTL pulse. (Output ± 15 V)

(Foreign prices higher, plus taxes)

Vertical Bore Imaging, 3-Axes Gradient Probes

Gradient Probes for High-Field Vertical Bore MRI Microscopy

5 mm to 12 mm Imaging Probes

- Highest S/N
- 350 G/cm at 2.3% duty cycle, water cooled
- Quick, convenient, multi-X tuning
- For magnets up to 900 MHz
- 5, 8, 10, or 12 mm RF Coils

Our MRI probe is designed for high-field magnets with 40 to 72 mm inside the RT shims. The MRI probe includes the 26-40 gradient coil* and ^1H or $^1\text{H}/\text{X}$, rf Litz coils. This probe is normally provided with conventional top "NMR-tube" access. The probe permits highest gradients at highest fields.

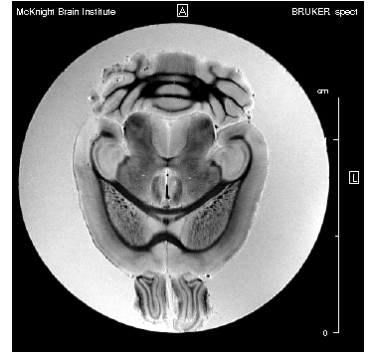
Effectiveness of the litzcage coil can be seen in the 50 micron resolution of the mouse brain taken at 750 MHz and the mouse rat kidney images at 800 MHz.



NB MRI Probe with 26-40 Gradients and RF

Mouse Brain

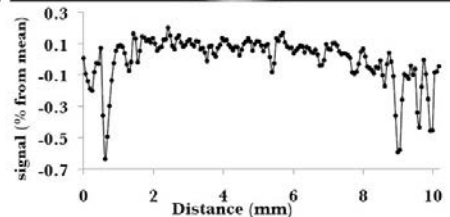
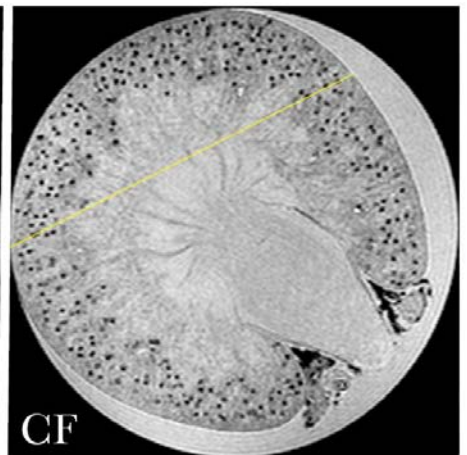
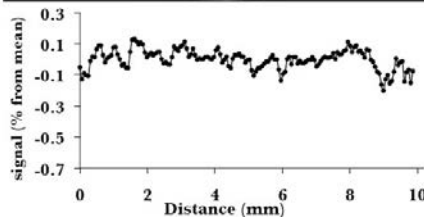
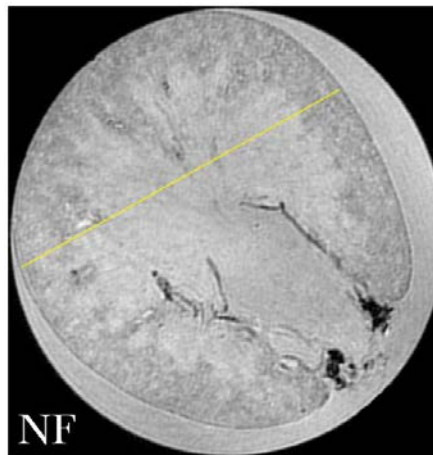
50-micron resolution
Using 21 mm CP Litzcage at 750 MHz inside a Doty vertical bore imaging probe. Courtesy of Dan Plant, Univ. of Florida.



Rat Kidney

High resolution images from a healthy rat kidney were acquired at 800 MHz, without contrast (NF), and with contrast (CF). The plot below each image shows the percent change in signal intensity (from mean) versus length, along the yellow line. Each spike on the plot under the contrasted kidney represents a single kidney glomerulus (100-150 μm diameter).

Images courtesy of Scott Beeman, Dr. Brian Cherry, Dr. Jeff Yarger, and Dr. Kevin Bennett, Arizona State University.



RF Litz Volume Coils For NB or WB Vertical Bore Probes

Probe O.D. (mm)	RF Coil I.D. (mm)	Shield Diameter (mm)	Tuning	^1H MHz	Mod. Load τ_{90} 's (μs)		Heavy Load τ_{90} 's (μs)	
					^1H	^{31}P	^1H	^{31}P
40-72	10	26	$^1\text{H}/\text{X}$	500	9	12	10	14
40-72	12	26	^1H	500	9	-	12	-
40-72	10	26	$^1\text{H}/\text{X}$	600	11	13	12	15
40-72	12	26	^1H	800	10	-	16	-

For the above coils, the length of homogeneous region is 80% of the coil ID. Coils with a multi-x channel normally tune ^{31}P through ^{13}C simply by changing plug-in capacitors. All coils feature simple tuning, high B_1 homogeneity, external rf shield, and susceptibility matching near the sample region.

*Gradient specifications – following page. (For more information on Litz or Litzcage coils, see page 9.)

Small MRI 3-Axes Gradient Coils

All models feature active shielding and B_0 eddy current compensation.

- ✓ **Maximum Sample Volume** ✓ **Low Noise and Vibration** ✓ **High Continuous Gradients**

Advances in hardware for magnetic resonance imaging (MRI) are needed to improve image quality, ease of use, and functionality in high-field MRI research using small-animal models. Doty's MRI gradient coils fill this need.

Low-amplitude B_0 eddies are induced in the magnet radiation shields primarily from minute variations in coil diameters along the axis or from axial registration errors between the gradient and shield coils. Our use of alumina ceramic for both the gradient and shield formers allows higher precision to be maintained, and low-amplitude eddy current to be minimal. Ceramic coil forms, together with heavy Goly windings dramatically reduce vibration and noise, even at the highest fields.

Any remaining B_0 eddy is compensated by a time-dependent correction applied to a B_0 shim coil. Another advantage of the alumina coil form is its very high thermal conductivity, which helps equilibrate hot spots. The cooling requirements are then satisfied with relatively minor constraints on the winding geometry.

Higher-order eddies are minimized by active shielding. Our coil designs often achieve a factor of 2 better shielding of the transverse gradients than alternative designs.

There is a strong benefit from gradient coil construction with an alumina ceramic coilform and multilayer windings. We significantly reduce acoustic noise, vibration, and recovery time, compared to gradient coils from other microscopy MR vendors.

<i>Doty VB MRI Probes</i> Parameter	Model 26-40	Units
Cooling method	water	
diameter (d_i) for 4% local deviation	14	mm
length (z_i) for 4% local deviation	17	mm
diameter (d_i) for 10% local deviation	18	mm
length (z_i) for 10% local deviation	22	mm
Nearest Gradient Null point	15.4	mm
Outside diameter, d_o	39.6	mm
Coil half-length, h_1	36.1	mm
RF shield diameter, d_s	26	mm
Clear bore, d_f	23.6	mm
Max inductance, L	37	μH
Max DC resistance, R_E	1.4	Ω
Min gradient gain, α	48	mT/Am
Max shielding error at $1.5 d_o$	0.4	%
Min slew rate, $G_S = \alpha V/L$, at 1 V	1,189	T/m/s
Continuous current, I_{RMS}	11	A
Continuous gradient, G_C	53	G/cm
Peak Voltage	120	V
Approx. EPI Acoustic Noise, 7 T	70	dBa
Rise time to G_C for 100 V	4.6	μs
Total mass	0.4	kg



gradients partially assembled



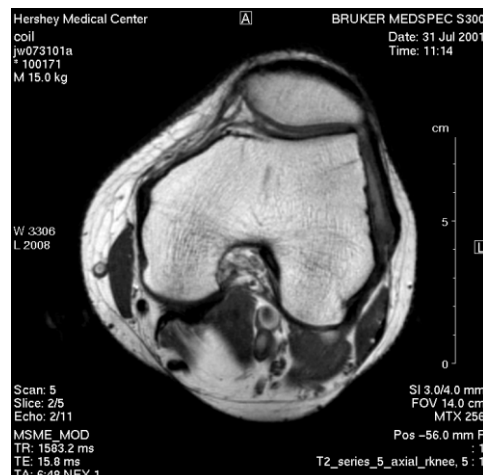
Local deviation (or differential linearity) is defined as the rms deviation from the mean gradient over the specified diameter, d_i , and length, z_i , of the cylindrical sample region. The half-length h_1 is the distance from the center to the closer of the two external end surfaces. Eddy currents from the internal RF shield are negligible. The gradient slew rate G_S is the instantaneous rate of change in gradient when a 1 V step is applied. The continuous current ratings are *true* continuous ratings for a single axis with no time limit and adequate cooling. Derate the current 30% when all three axes are driven simultaneously.

Knee, Other Extremities, or Primate Head High-Field RF Imaging Coils

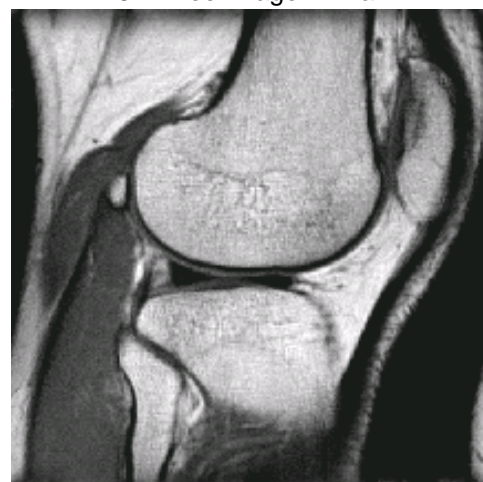
Doty rf Litz and Litzcage Modules

- Highest homogeneity
- Highest S/N
- Quick, simple tuning for all sample sizes
- Double-resonance, multi-nuclear tuning available

Knee imaging at high fields with conventional coils has often been problematic because of the enormous difference in loading between a small and a large patient. The unique tuning/balancing methods utilized in all Doty coils make tune-up predictable, simple, and quick.

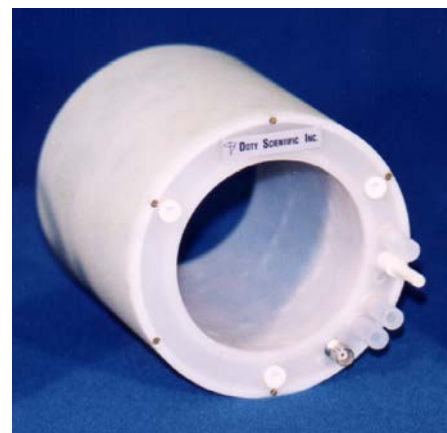


3T Knee Image - Axial



3 T Knee Image - Sagittal

Images: Courtesy of Dr. Qing X. Yang
Hershey Medical Center, Penn State Univ.



RF Litz coil module

For additional information about the Doty Litz coil design:

F. David Doty, George Entzminger Jr, and Cory D. Hauck, "Error-Tolerant RF Litz Coils for NMR/MRI", *J. Magn. Reson.*, 1999, 140:17-31.

18 x 18 cm FOV CP Litzcage Knee Coils			
¹ H MHz	τ ₉₀ , μs	Square pulse, Power, W	
		Light load	Heavy load
64	120	180	1000
80	100	350	1500
125	100	500	1500
170	125	500	1500
200	150	500	1500

Light load – 35 mM Saline, Heavy Load –100 mM Saline, at 75% of ID

Our linear Litz coils are recommended for double-resonance applications, and their exceptional sensitivity and homogeneity are demonstrated in the images shown at the right. Typical efficiency of a double-resonance Litz coil is illustrated in the table below.

18 x 18 cm FOV H/P Litz Knee Coils					
Tuning	¹ H MHz	Light Load τ ₉₀ (μs) @ 500 W		Heavy Load τ ₉₀ (μs) @ 1 kW	
		¹ H	³¹ P	¹ H	³¹ P
¹ H/X	64	100	170	110	130
¹ H/X	80	120	180	130	150
¹ H/X	125	150	230	200	200

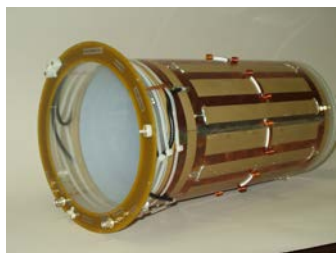
Light load – 35 mM Saline, Heavy Load –100 mM Saline, at 75% of ID

Other Typical RF Litz Volume Coils							
Clear I.D. mm	O.D. mm	Tuning	¹ H MHz	Moderate Load τ ₉₀ 's (μs) @ 500 W		Heavy Load τ ₉₀ 's (μs) @ 1 kW	
				¹ H	³¹ P	¹ H	³¹ P
100	150	¹ H	128	36	-	82	-
100	150	¹ H/X	200	58	80	110	160
130	200	¹ H/X	170	85	110	160	200
135	200	¹ H	128	70	-	130	-
150	220	¹ H	128	90	-	200	-
150	230	¹ H/X	128	100	140	210	200
150	220	¹ H	170	120	-	270	-
200	300	¹ H/X	128	160	320	300	340

Length of homogeneous region - 80% of the coil ID.
Moderate load –50 mM saline, 70 % of the coil ID
Heavy load –100 mM saline, 75% of the coil ID

Simple-tune Litz and Litzcage RF Coils up to 750 MHz

What is a Doty RF Litzcage Coil?



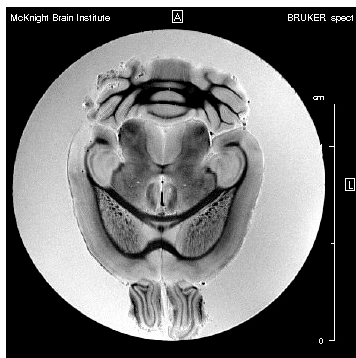
Doty *Litzcage* coils combine the Circular-Polarization (CP) of a *rf* birdcage coil and the insulated crossovers of the Doty *rf Litz* coil to produce a superior quadrature coil with easy tuning.

What is a Doty RF Litz Coil?



The *Litz* (woven) coil utilizes etched foil patterns with insulated crossovers to obtain *rf* flux transparency and improved S/N. Special symmetries permit an ideal current distribution that is largely independent of tuning, matching, and balancing adjustments. Homogeneity is excellent and tuning is simple.

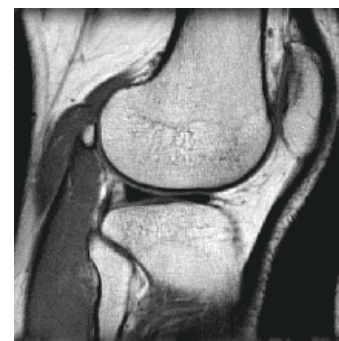
How do Litz coils or Litzcages compare to Birdcages?



50-micron resolution.

Mouse brain image, using 21 mm CP *Litzcage* at 750 MHz (inside a Doty vertical bore imaging probe). Courtesy of Dan Plant, Univ. of Florida.

- **Much Easier Tuning.** They easily tune and match to a wide range of samples. The *Litz* coil can be single-tuned or double-tuned.
- **B₁ homogeneity is typically 10-40% better.**
- **SNR is at least 10% higher – up to 30% higher.**
- **Substantial cost advantage.**



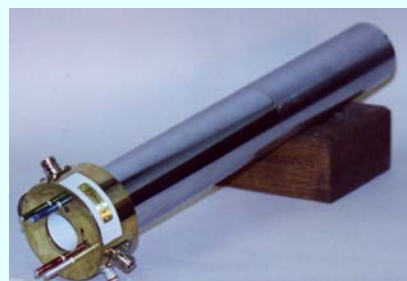
The T2 knee image was acquired at 3T with a 16 cm Doty *Litz* coil. Courtesy of Qing Yang, Ph.D. Hershey Medical Center, Hershey, PA.

RF Litzcage Small Animal Platform



RF *Litz* or *Litzcage* Modules

Vertical Bore MRI Probe with RF *Litz* or *Litzcage*



Ordering Information

Coils and Probes Are Available for Most Magnets

<p>For Sales and Service in the USA:</p> <p style="text-align: center;">DOTY SCIENTIFIC, INC. 700 Clemson Road Columbia, SC 29229 USA</p> <p>Phone: 1 (803) 788-6497 Fax: 1 (803) 736-5495</p> <p>E-mail: sales@dotynmr.com service@dotynmr.com</p> <p>Website: www.dotynmr.com</p>	<p>For Sales and Service in Japan:</p> <p style="text-align: center;">L.A.Systems, Inc. Takao Okada, Ph.D. Tokei-Kaikan Bldg. 1F 1-11-5 Ueno, Taito-ku Tokyo, 110-0005, JAPAN</p> <p>Phone: +81-3-5812-5311 Fax: +81-3-5807-4050</p> <p>Email: support@las.jp</p> <p>Website: www.las.jp</p>
<p>For European Sales and Service:</p> <p style="text-align: center;">ROTOTEC-SPINTEC GmbH David H. Cross Weiterstädter Weg 2a 64347 Griesheim GERMANY</p> <p>Phone: +49 (0) 6155 60830-0 Fax: +49 (0) 6155 60830-29</p> <p>E-mail: cross@rototec-spintec.com</p> <p>Website: www.rototec-spintec.com</p>	<p>For Sales in France and Belgium:</p> <p style="text-align: center;">RS2D Rémy Schimpf Parc d'Activités 24, rue des Couturières F67240 BISCHWILLER CEDEX FRANCE</p> <p>Phone: +33 (0)388 93 92 63 Fax: +33 (0)388 93 92 59</p> <p>E-mail: rs@rs2d.com</p> <p>Website: www.rs2d.com</p>

Pricing:

- ◆ **There is a \$50 minimum per order.**
- ◆ For probe prices, please request a quotation. The quote will enable us to confirm prices and probe specifications.
- ◆ Shipping and handling charges will be prepaid and added to the invoice.
- ◆ **Pricing is for U.S. domestic sales and subject to change without notice.**
Add 15% plus customs duties for foreign sales.
Add 5% plus customs duties for Canada.

Volume Discounts For Rotors, Caps and Other Small Items		
Price Per Item	Quantity Per Line Item	Discount
under \$ 100	4-9	10%
under \$ 100	10 or more	20%
\$100 - \$ 500	4-9	10%
\$100 - \$ 500	10 or more	15%
\$501 - \$1000	4-9	5%
\$501 - \$1000	10 or more	10%

Doty Scientific Warranty Information

DSI warrants that its products will conform to the specifications quoted when used with reasonable care within specifications, and in conjunction with properly performing instruments, for a period of one year from the date shipped. **Exceptions: (1) Rotors and turbine caps are not covered under warranty because rotors and caps may be damaged by IMPROPER handling. Please follow the instructions in your manual. (2) Probe VT components may not be covered under warranty unless the probe is used with a DSI VT controller. Products requiring service or modification may be returned with freight, insurance, and handling fees prepaid. DSI will return repaired products freight prepaid. DSI assumes no responsibility for the repair or modification of products not provided by Doty Scientific.**



MasterCard and Visa Are Accepted

Doty MRI Coils & Probes

Doty Scientific, Inc.

700 Clemson Rd. Columbia, SC 29229 USA

Phone: (803) 788-6497

Fax: (803) 736-5495

Email: sales@dotynmr.com

Website: www.dotynmr.com