Magnetic resonance force microscopy for condensed matter

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Nomenclature

Constants

Name	**Symbol**	**Value**
Vacuum permeability	μ_0	$4\pi \times 10^{-7}$ TmA^{-1}
Bohr magneton	μ_B	9.274×10^{-24} JT^{-1}
Nuclear magneton	μ_N	5.051×10^{-27} JT^{-1}
Planck's constant	h	6.626×10^{-34} Js
Reduced Planck's constant	$\hbar$	1.055×10^{-34} Js
Boltzmann constant	k_B	1.381×10^{-23} JK^{-1}

Experimental parameters

Description	**Symbol(s)**	**Units**	**Typical value**	**Page(s)**
Friction cantilever	γ	kg/s	1.3×10^{-13} kg/s	27
Magnetic field	B_0	T	$10 - 200$ mT	48, 55, 71
Rotating magnetic field	B_{rf}	T	$1 - 10$ µT	55
Alternating magnetic field	$B_{rf,a}$	T	$1 - 10$ µT	87
Resonance slice thickness	d	m	$31 - 90$ nm	61, 76
Diameter magnetic particle	D	m	3.43 µm	27
Resonance frequency cantilever	f_0, f_1	Hz	3.0×10^3 Hz	26 , 86, 106
Stiffness cantilever	k_0	N/m	7.0×10^{-5} N/m	26, 106
(Effective) mass cantilever	m_{eff}	kg	2.0×10^{-13} kg	27, 106
magnetic dipole	m, M	Am^2	1.9×10^{-11} Am^2	74, 106
Saturation magnetization	M_r	T	1.15 T	27, 106
Intrinsic quality factor cantilever	Q_0	1	3×10^4	28
Saturation parameter	s	1	> 1	62, 71, 91
Spin-lattice relaxation time	T_1	s	$-$	13, 44, 78, 102
Spin-spin relaxation time	T_2	s	$-$	44, 74