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AN EPR METHODOLOGY FOR MEASURING THE LONDON PENETRATION DEPTH FOR THE CERAMIC SUPERCONDUTORS

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In this presentation we shall discuss the use of electron paramagnetic resonance (EPR) as a quick and easily accessible method for measuring the London penetration depth, λ, for the high-T_c superconductors. The method utilizes the broadening of the EPR signal, due to the emergence of the magnetic flux lattice, of a free radical adsorbed on the surface of the sample. The second moment, $\langle\Delta H^2\rangle$, of the EPR signal below T_c is fitted to the Brandt equation for a simple triangular lattice: $\langle\Delta H^2\rangle = 0.000371\lambda_0[1-(T/T_c)^4]^{-1/2}$. Application of this methodology yields $\lambda_0 = 2520 \pm 100$ Å with $T_c = 119$ K for the $Tl_2Ba_2Ca_2Cu_3O_x$, and $\lambda_0 = 2700 \pm 100$ Å with $T_c = 84$ K for $Bi_2Sr_2Ca_2Cu_2O_x$. The precision of this method (±100 Å or better) compares quite favorably with those of the more standard methods such as μ^+SR, Neutron scattering and magnetic susceptibility.