Lecture 1

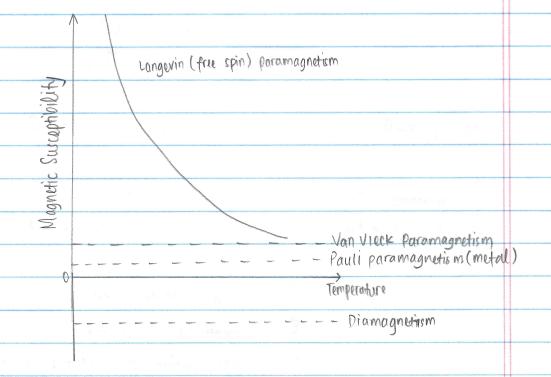
	*				
	Maxwell equation in mate	rial			
SI:	Maxwell equation in mate $\nabla \cdot \vec{D} = \rho$	Gaussian:	V.Ď	= 4119	(Gauss)
			V.B	0 2	(Gauce)
	V-B = 0		VXÈ	= - 1 28	(Maxwell-Faraday)
	$\nabla \cdot \vec{B} = 0$ $\nabla \times \vec{E} = -\partial \vec{B}$			c at	(/
	. At		ヤャナ	= 471] +1	30 (Ampere-
	$\nabla_{x}\vec{B} = ho (\vec{J} + 20)$	<u> </u>		CCC	It Maxwell)
		et /	7 7 4	1911 Marghann	
	$\vec{D} = \mathcal{E}_0 \vec{E} + \vec{p}$; where	P = NP/V	D	= E + 411 P	
	B = 40H + M	p is Electric dipole	B	= H + 4TM	
	$ \vec{D} = \mathcal{E}_0 \vec{E} + \vec{p} ; \text{ where} $ $ \vec{B} = \mathcal{A}_0 \vec{H} + \vec{M} $ $ \vec{D} = \mathcal{E}_0 \vec{E}_1 + \vec{M}_1 = 0 $	p= 9d = statc.cm	B	= MA	
					,
,		garawa (no	M	= 4-17	
				411	
	M = 1 2m F		M	= Xm H; wh	ere U = 1 + 417 Xm
				57	
	B is measured in T		· B is	menured in Go	us
	H is measured in A/m		A i	s measured in	Dersted Dersted
× 5	Frigure 1 Special Community			· .	
	H - applied magnetic field				
	\vec{N} - magnetic flux density \vec{N} - magnetisation per volume = $\vec{N} \cdot \vec{N}$				
	-4134)	11 Viagraisation			V
	The see Same White				
- 7	or to the day assume	and the barrier of the second		i ip warms the S	

$$\underline{\Phi}(\vec{r}) = \int d^3\vec{r}' \frac{\rho(\vec{r}_1)}{|\vec{r} - \vec{r}'|}$$
, where $\rho = \text{charge density}$

$$\nabla^2 \bar{\Phi} = 4\pi \rho$$

Energy density in vacuum: $u = U/V = \frac{1}{8\pi} (E^2 + B^2)$ Poynting vector: $\vec{S} = \frac{C}{4\pi} (\vec{E} \times \vec{B})$

what are the units for electric & magnetic dipoles? $\vec{P} = \text{stat C-em } (2\text{su units}) / \text{Debye } (\text{Gaussian units})$ $\vec{u} = \text{erg}/G (\text{Gaussian units})$



- Diamognetism (Larmor): Lenz's law on atomic electron
- Largevin foromagnetism: "Free spin" in magnetic field acign with field.
- Pauli paramognetism: alignment of conduction electrons with field $x \propto N(E_F)$
- Van vleek paramagnetism J=0 but S, L ≠ 0, 80 Q.M. mixing