Credits: Dr. Pietro Bonfà
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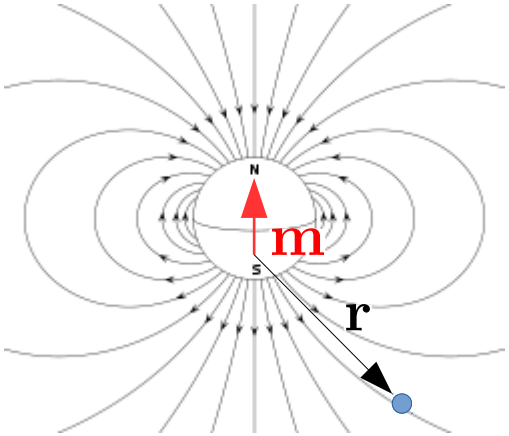
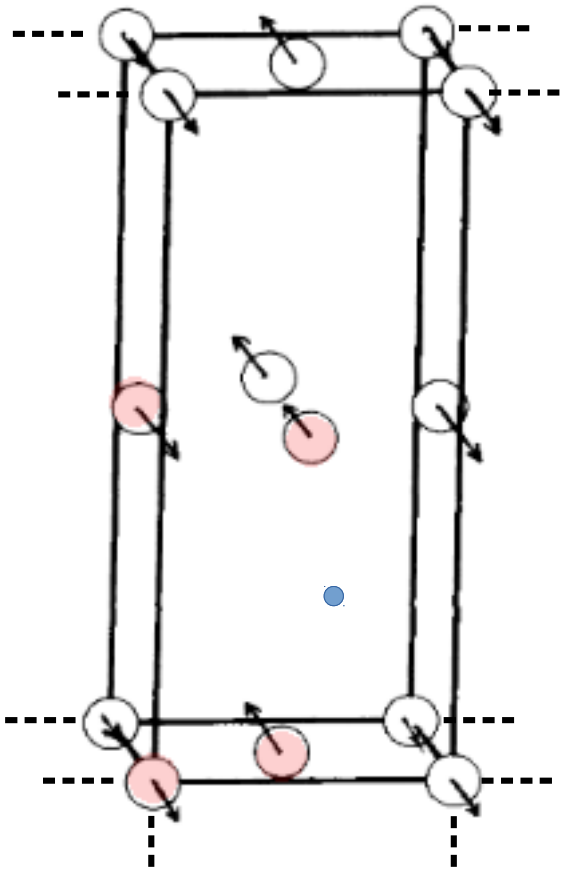


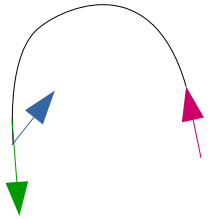


- YOU ARE HERE!

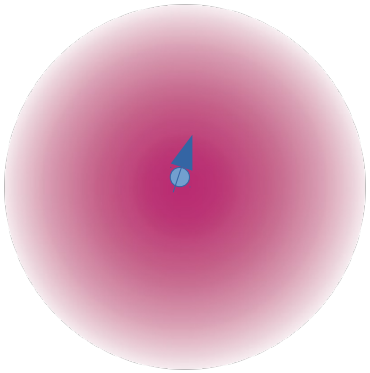
$$\mathbf{B}_{\mathrm{dip}} = \frac{\mu_0}{4\pi}\left(-\frac{\mathbf{m}}{r^3} + \frac{3(\mathbf{m}\cdot\mathbf{r})\mathbf{r}}{r^5}\right)$$

$$\mathbf{B}_{\mathrm{dip}} = \frac{\mu_0}{4\pi}\sum_{i=1}^{N}\left(-\frac{\mathbf{m}_i}{r_i^3} + \frac{3(\mathbf{m}_i\cdot\mathbf{r}_i)\mathbf{r}_i}{r_i^5}\right)$$

Contact field B_c



distant dipoles $\mathbf{B}_{\mathrm{dip}} = \frac{\mu_0}{4\pi}\left(-\frac{\mathbf{m}}{r^3} + \frac{3(\mathbf{m}\cdot\mathbf{r})\mathbf{r}}{r^5}\right)$



within atoms
when $r = 0$

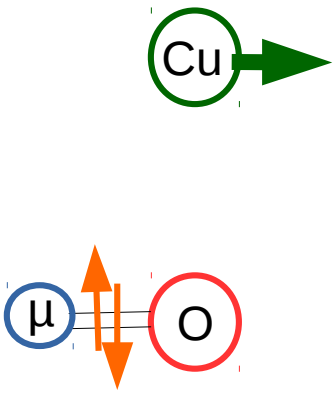
$$\mathbf{B}_c = \overbrace{\frac{2\mu_0}{3}|\psi(0)|^2}^{\text{some average of } \mu_0/4\pi r^3}\mathbf{m}$$

H (Mu)	15 T
Ti, V,Cr Fe,Mn,Co, Ni,Cu	10T/μB

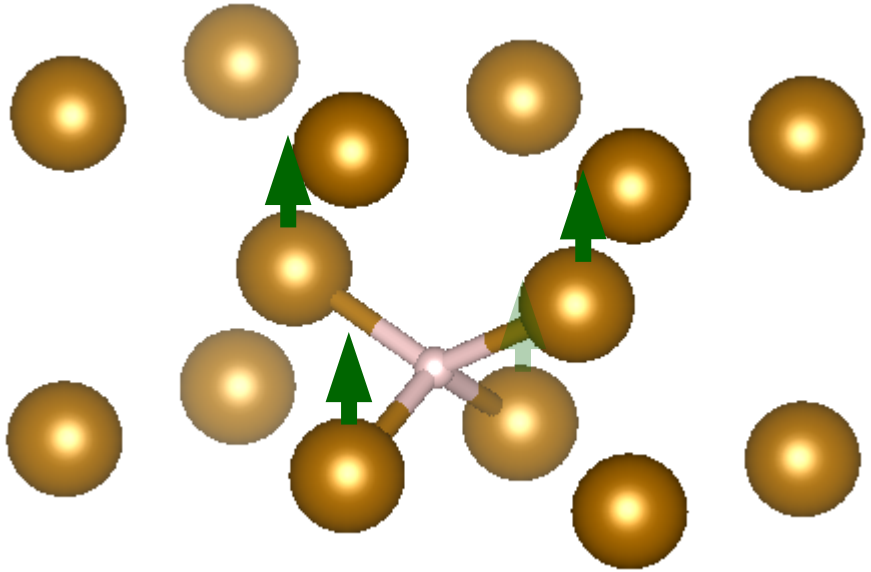
hyper

fine

Muon B_c in magnetic compounds



Small unpaired spin density at the muon $B_c \ll 10\,\mathrm{T}$



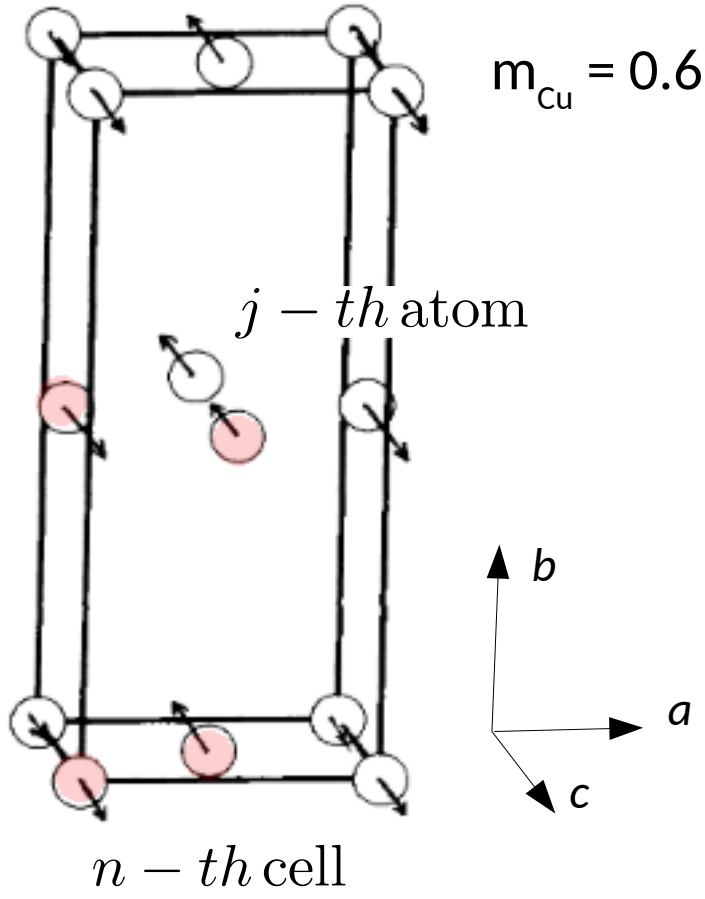
Fe bcc
tetrahedral site 0, 0.5, 0.25

In this case 4 equivalent Fe contribute equally

Magnetic structure

e.g. La_2CuO_4 group 64 *Cmca*

$$\mathbf{m}_{n,j} = \sum_{\mathbf{k}} \mathbf{S}_{\mathbf{k},j} e^{-i(\mathbf{k}\cdot\mathbf{R}_n + \phi_{\mathbf{k},j})}$$



$$k = 0$$

e.g. $\mathbf{S}_j = (0, 0, \pm 0.6)\mu_B$

References

github muesr by Pietro Bonfà: https://github.com/bonfus/muesr

ReadTheDocs: http://muesr.readthedocs.io/en/latest/Install.html

Magnetic structures: FullProf by Juan Rodrigues-Carvajal
https://neutrons2.ornl.gov/conf/2014/magstr/docs/Tutorial_Magnetic_Structures.pdf

Useful crysallography aids: http://www.cryst.ehu.es/#retrievaltop