Magnetic Imaging Techniques

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Types of Magnetism

Ferromagnetism

Helimagnetism

Antiferromagnetism

Ferrimagnetism

Spin-Canted Magnetism

Paramagnetism

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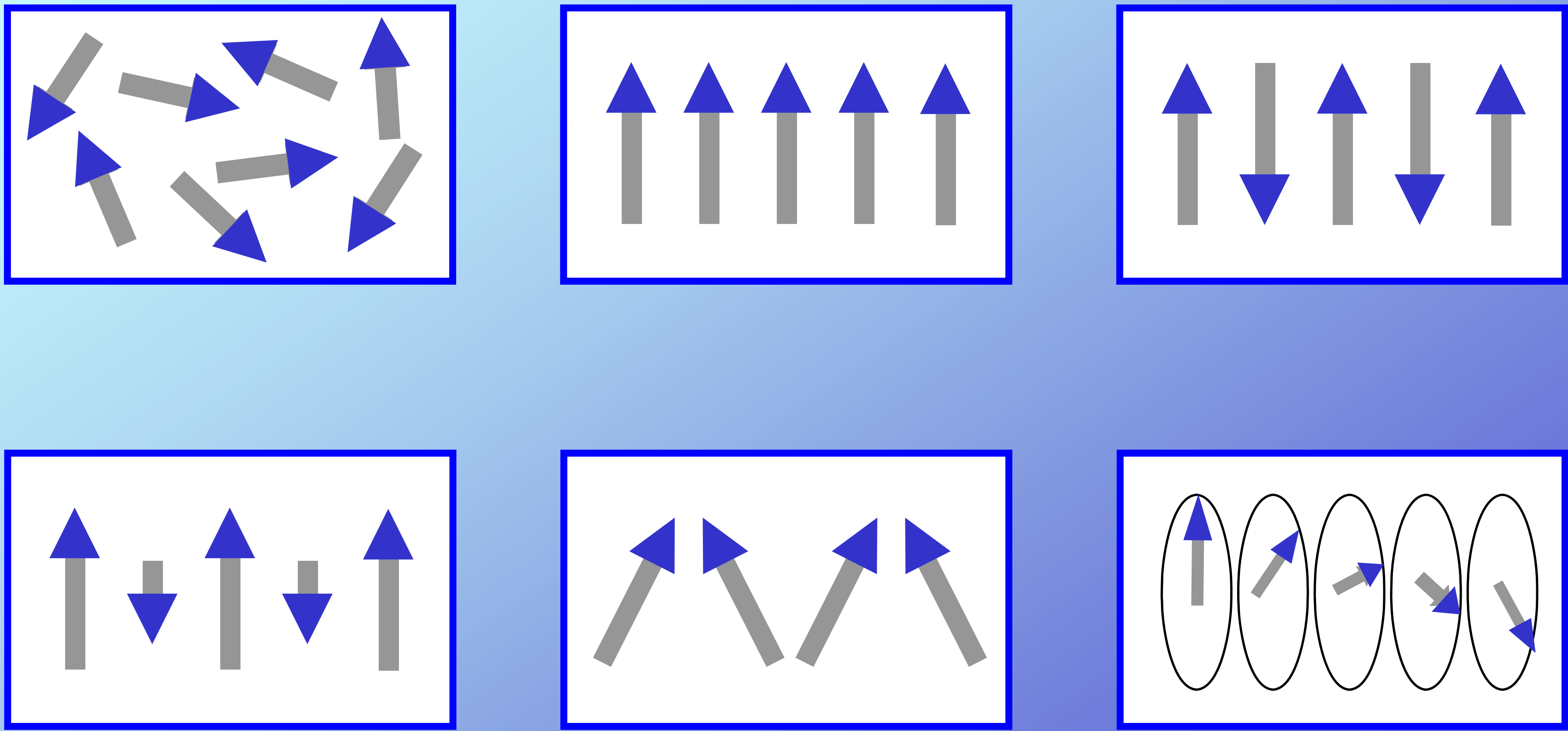
Types of Magnetism



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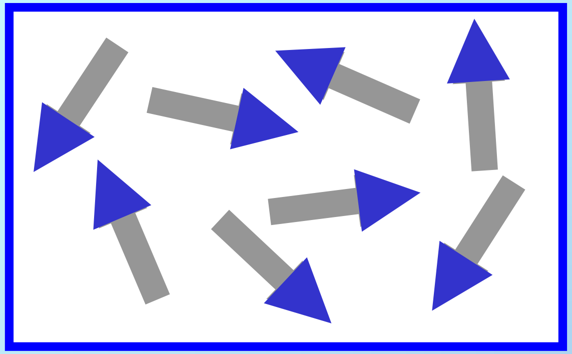
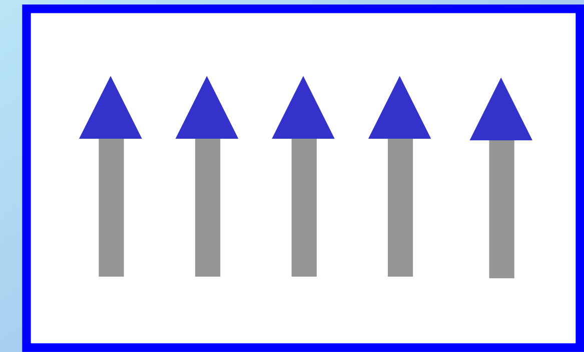
Types of Magnetism

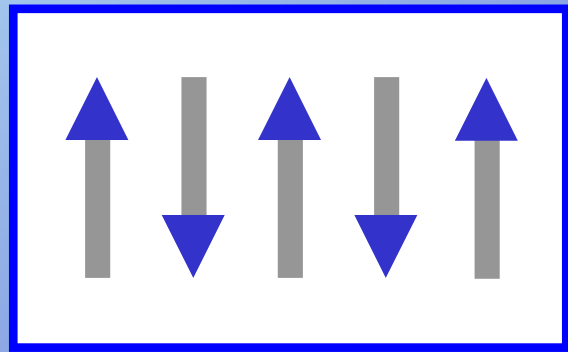
Paramagnetism



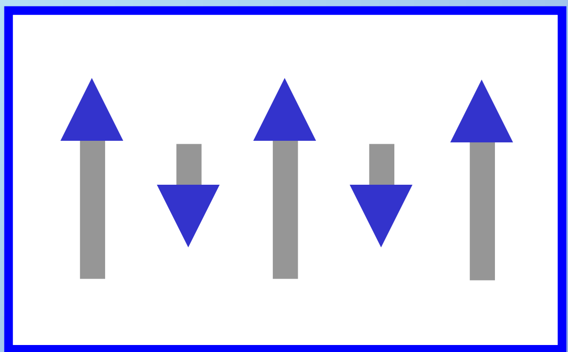
Ferromagnetism



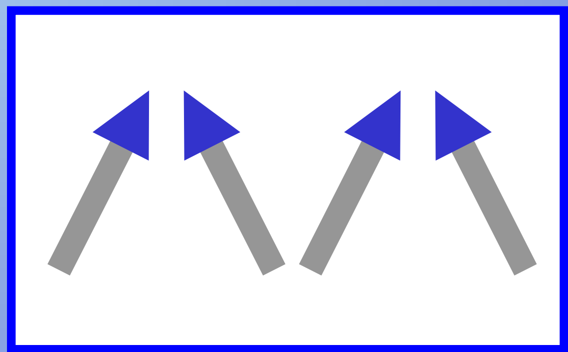
Antiferromagnetism



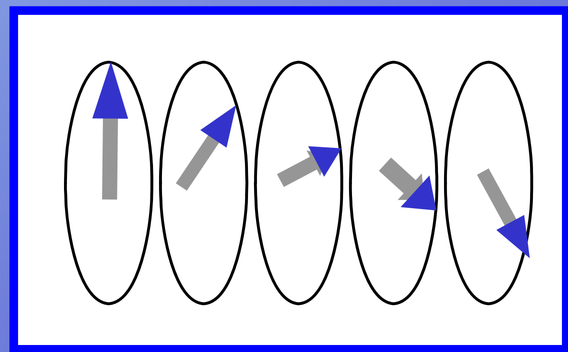
Ferrimagnetism



Spin-Canted



Helimagnetism



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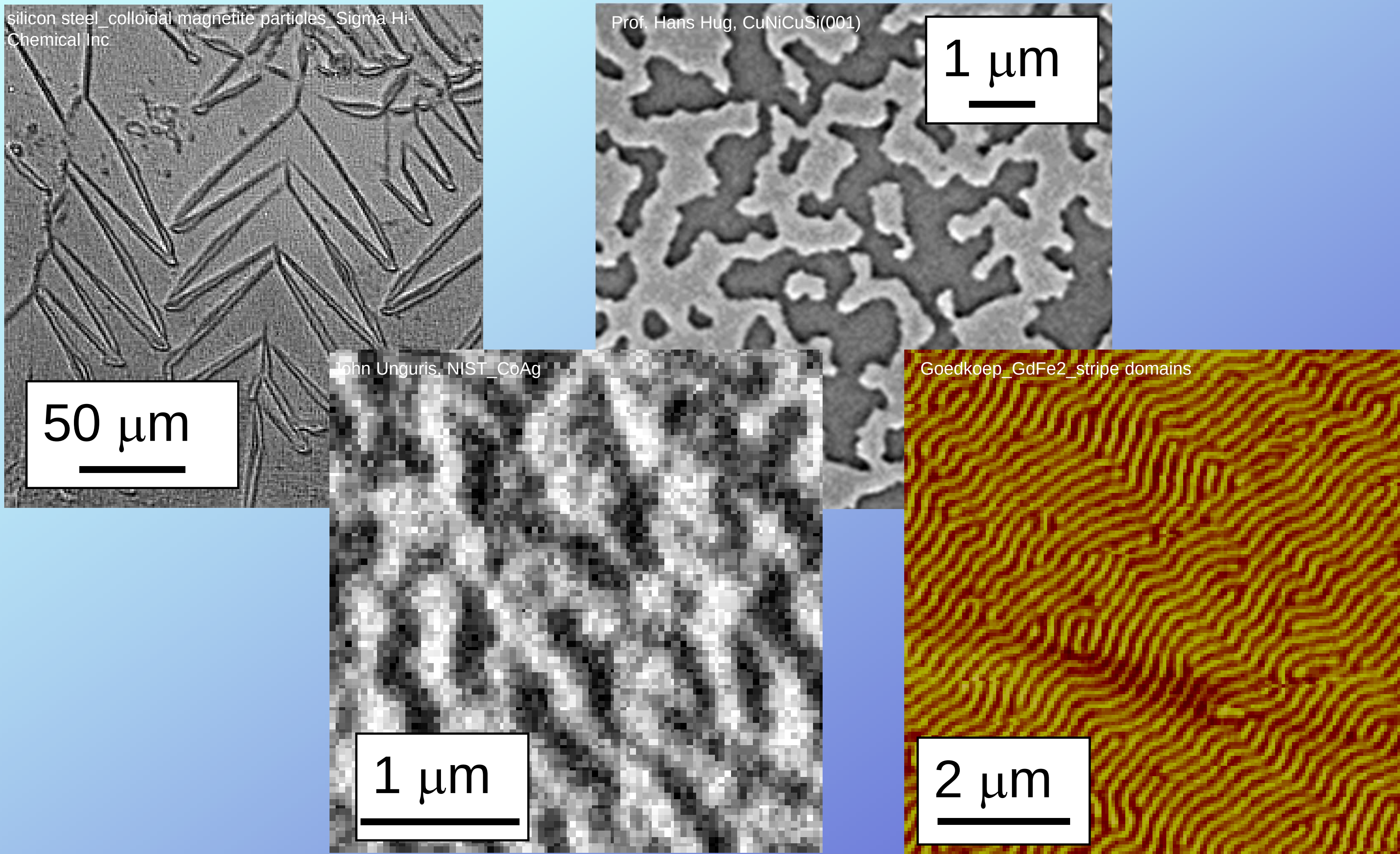
Magnetic Domains ?



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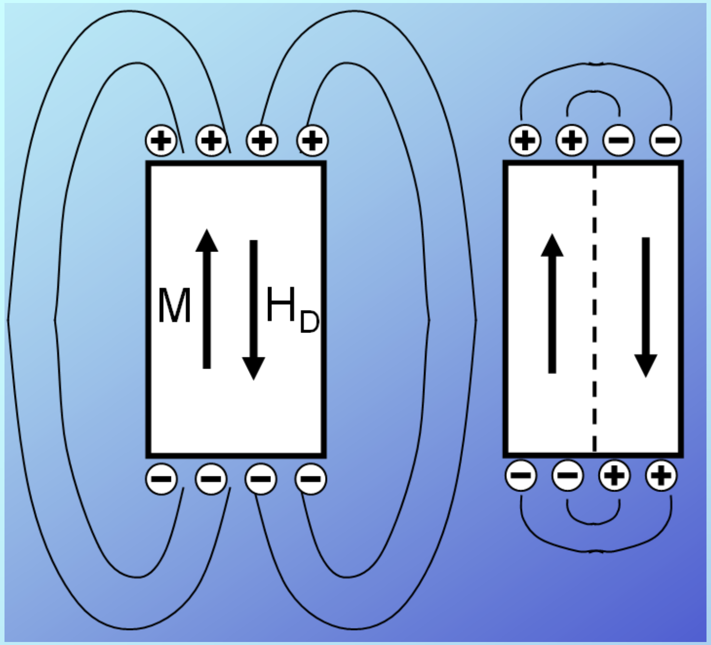
Imaging Techniques



- Magnetic flux density (or induction):

$$\mathbf{B} = \mu_0\mathbf{H} + \mathbf{J}$$

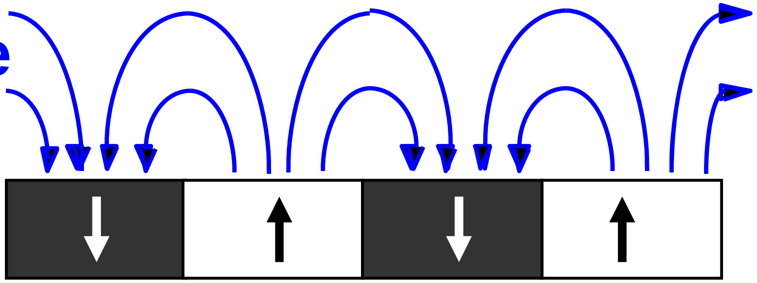
H = magnetic field (external + stray field)

J = magnetic polarization (magnetization $\mu_0\mathbf{M}$ = **q/V** magnetic moment / volume)

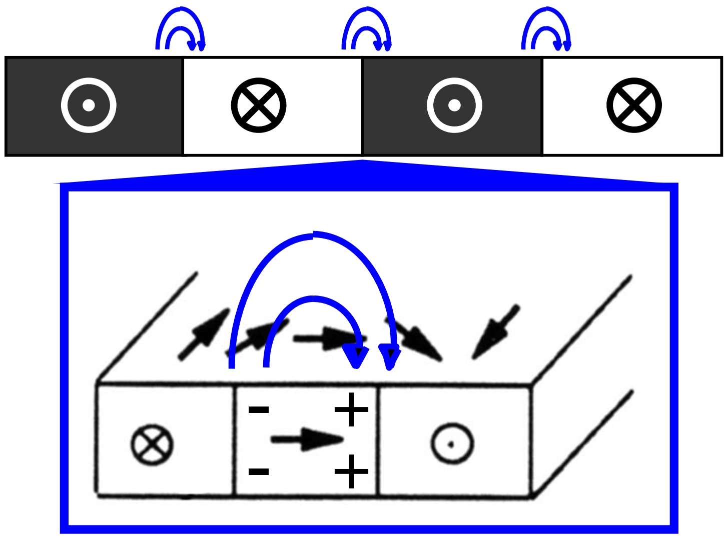
- Maxwell's equation div**B** = 0, therefore:

div**H** = -div**M** ➔ any divergence of **M** creates a stray field **H** (zero external field)

Out-of-plane



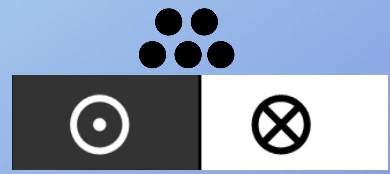
In-plane

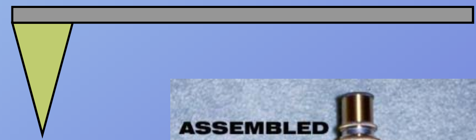


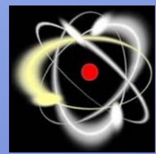
Imaging techniques provide information on stray field, magnetization (magnitude and direction), magnetic induction (includes stray field and magnetization) at material surface or through a thin film

Imaging Techniques

- Bitter Technique
- Scanning Probe Microscopy
- Electron Microscopy
- Kerr Microscopy
- X-Ray Microscopy Techniques







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