SORBONNE UNIVERSITÉ
LCPMR
INSP INSTITUT DES NANOSCIENCES DE PARIS
SUMO platform

# Measurement of ultrafast magnetization dynamics using Transverse Magneto Optical Kerr Effect in optical wavelengths

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Supervisors: Boris Vodungbo and Emmanuelle Jal

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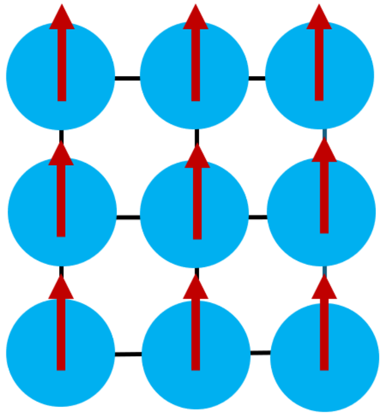
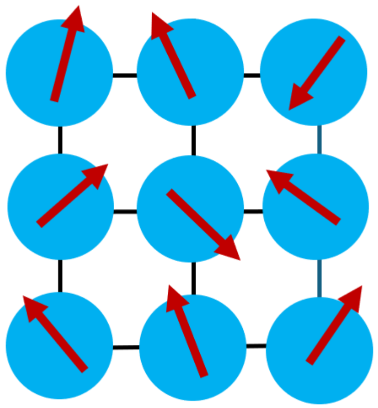
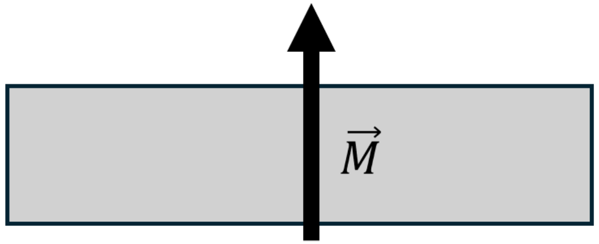


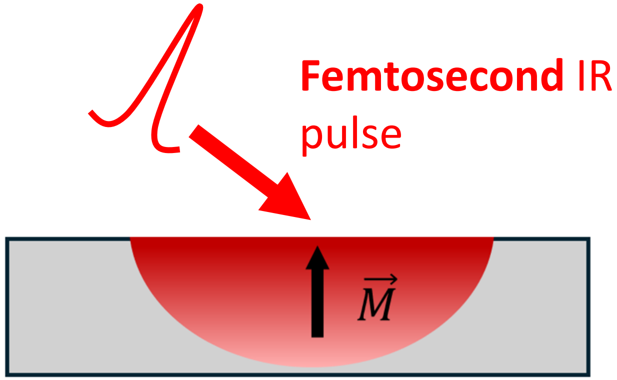
Magnetic moment ordering



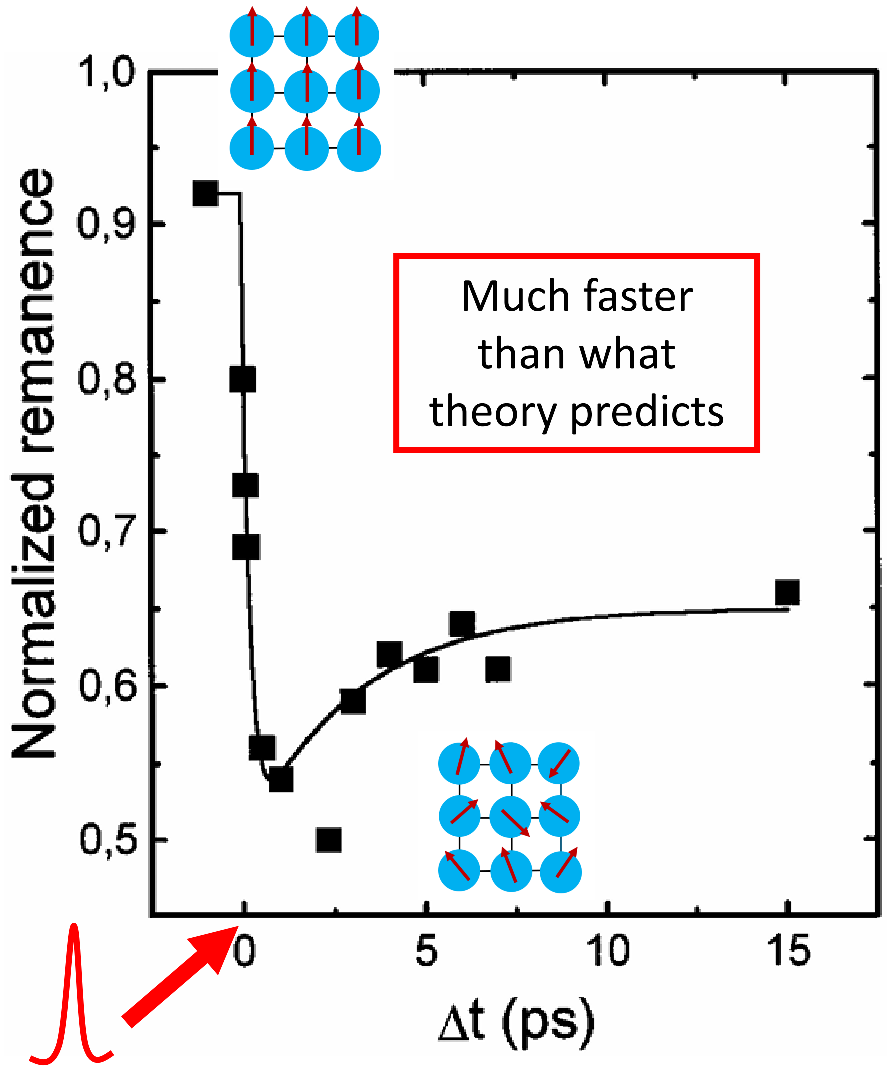
Disorder introduced




Ferromagnetic material




**Femtosecond** IR pulse




Beaurepaire et al. In: *Phys. Rev. Lett.* 76 (22 May 1996), pp. 4250–4253

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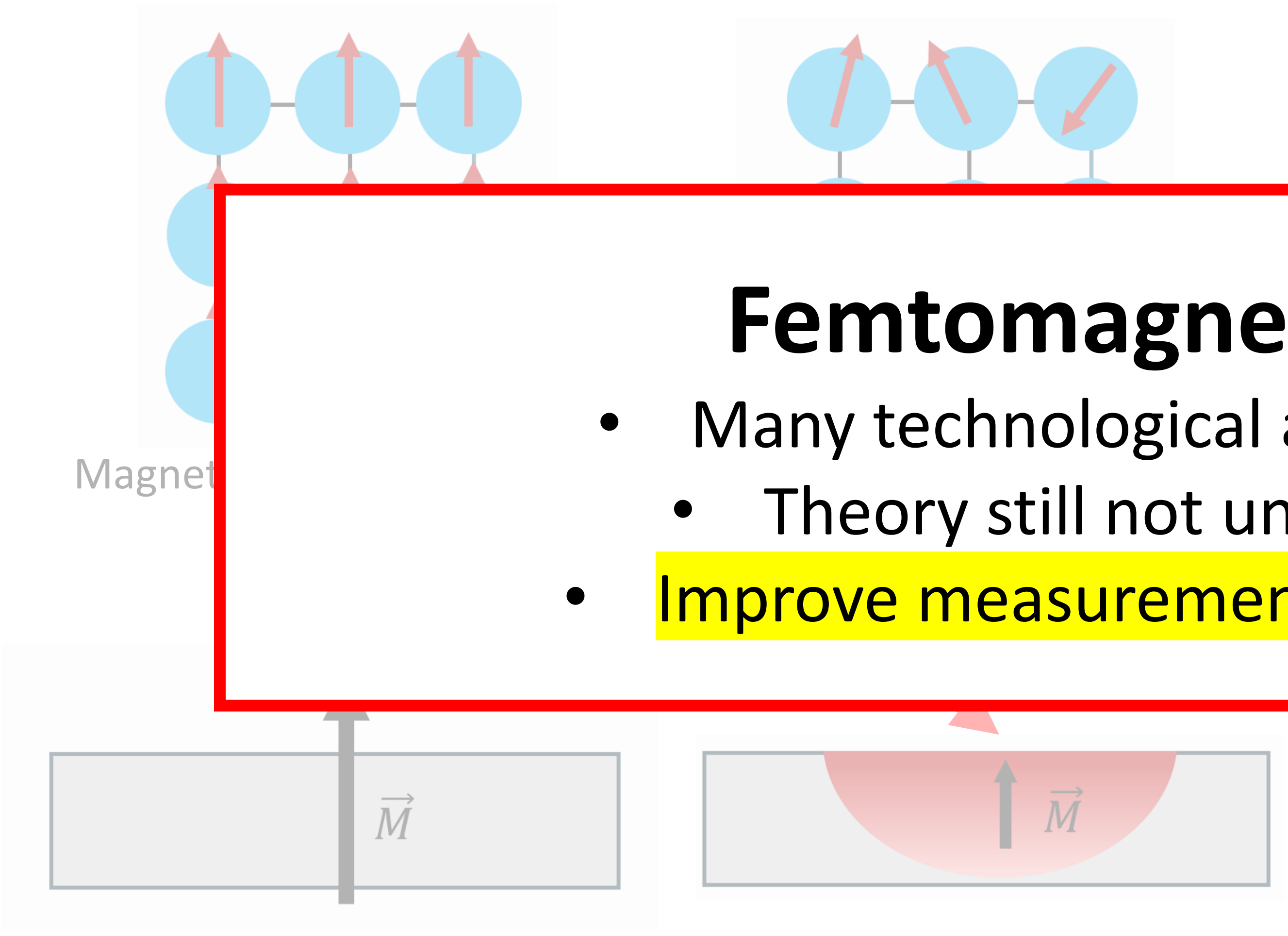


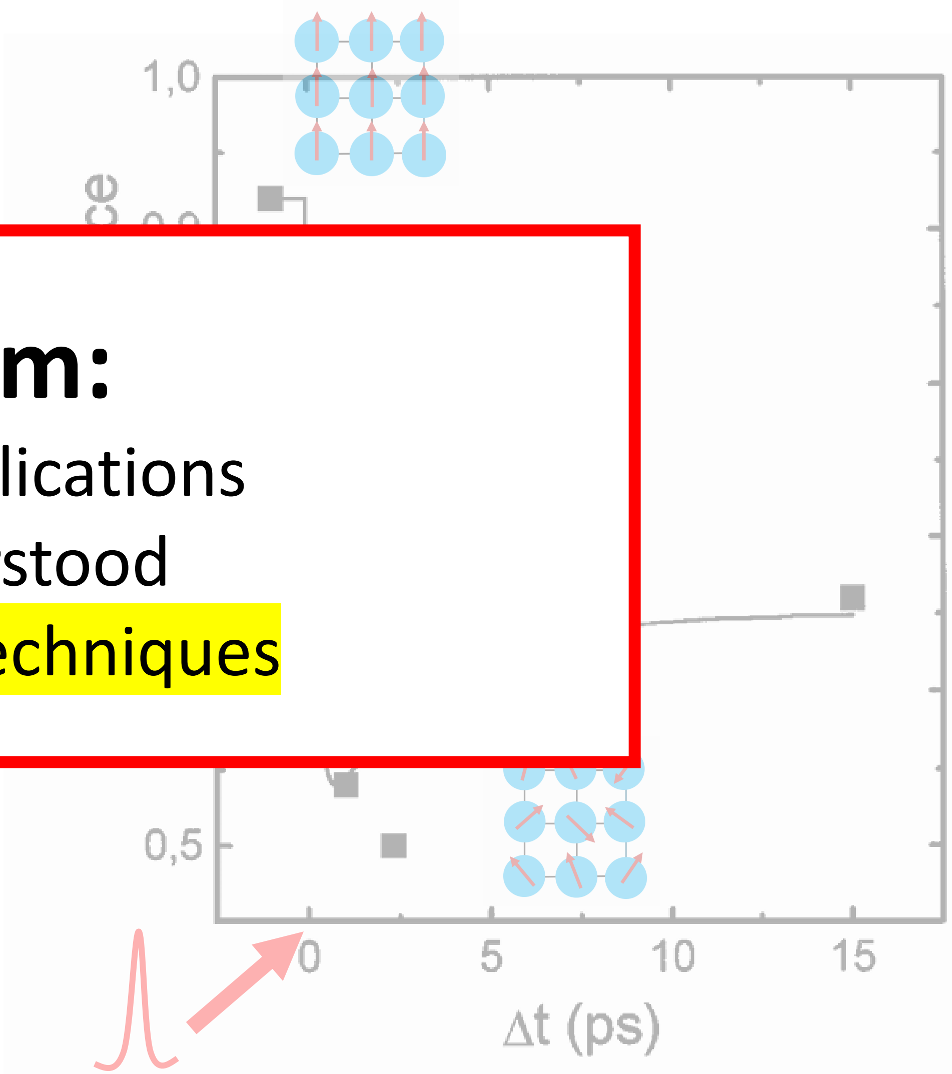


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## Femtomagnetism:

- Many technological applications
- Theory still not understood
- Improve measurement techniques

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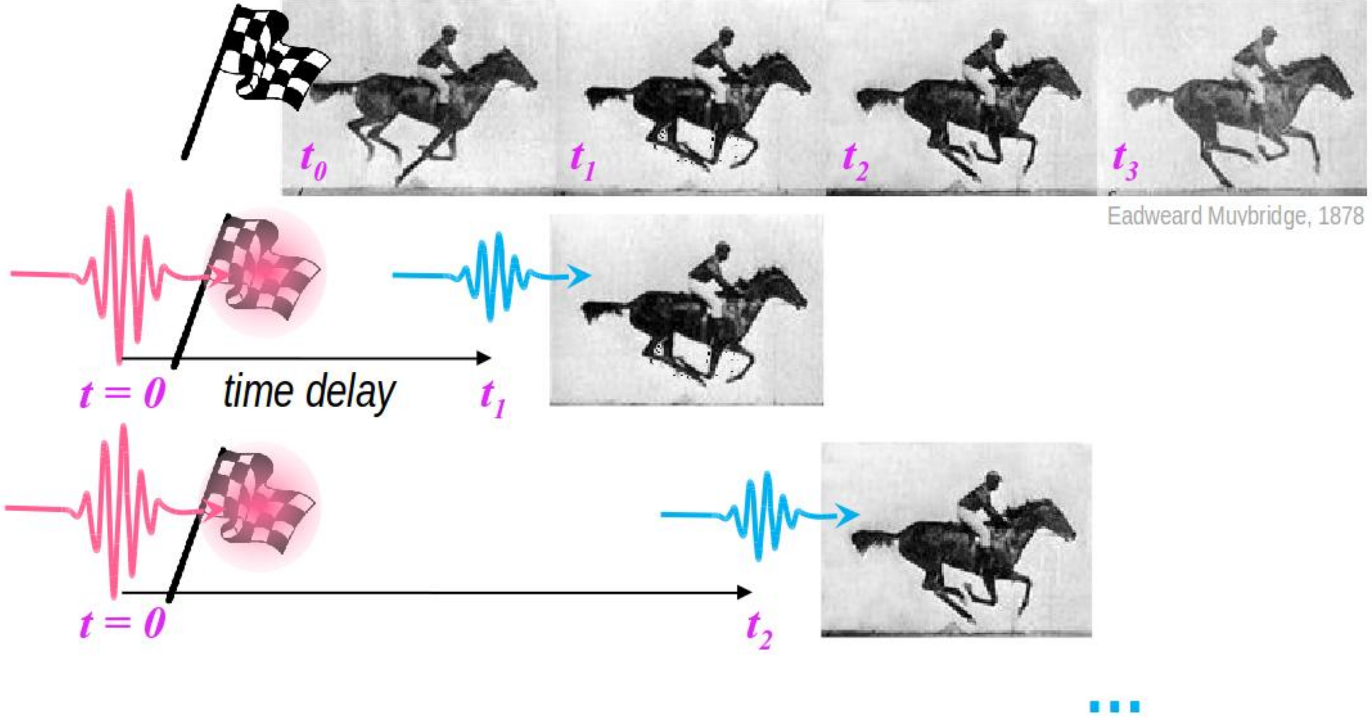
How do we measure phenomena at this time scale?

# Pump-probe:

- **Measurement is done with ultrashort light pulse (probe)**
- Vary the delay between the pump and the probe



# Measurement of ultrafast magnetization dynamics using Transverse Magneto Optical Kerr Effect in optical wavelengths

Probe = ultrashort light impulsion that measures the magnetization

$\underbrace{\text{X-rays} \qquad\qquad \text{UV}}$

- Large scale facilities (synchrotron, XFEL)
- High Harmonic Generation

$\underbrace{\text{visible-nIR}}$

Table-top femtosecond laser

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Measurement of change of polarization of the probe (rotation and ellipticity)

Works but complicated

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**GOAL**: simplify measurement → only measure **change in intensity**