EDM coupling: $H_{EDM} \propto \boldsymbol{\sigma} \cdot (a_0 \boldsymbol{E}^*)\cos(\omega_a t)$

Gradient coupling: $H_{grad} \propto \boldsymbol{\sigma} \cdot (\boldsymbol{\nabla} a_0)\cos(\omega_a t)$

$$H_{CASPEr} \propto \boldsymbol{\sigma} \cdot \boldsymbol{B_1^*}\cos(\omega_a t)$$
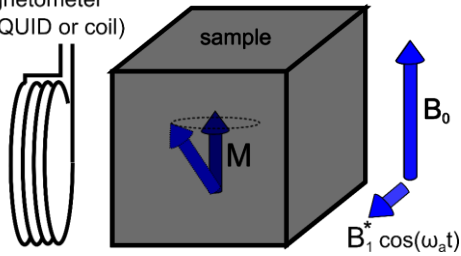
[Deniz Aybas et al., PRL **126,** 141802 (2021)]

EDM coupling: $H_{EDM} \propto \boldsymbol{\sigma} \cdot (a_0 \boldsymbol{E}^*)\cos(\omega_a t)$

Gradient coupling: $H_{grad} \propto \boldsymbol{\sigma} \cdot (\boldsymbol{\nabla} a_0)\cos(\omega_a t)$

$$H_{CASPEr} \propto \boldsymbol{\sigma} \cdot \boldsymbol{B_1^*}\cos(\omega_a t)$$

$$\hbar\omega_a = g\mu B_0$$

magnetometer (eg, SQUID or coil)

sample

M

B_0

$B_1^* \cos(\omega_a t)$

Using solid-state Nuclear Magnetic Resonance (NMR) to search for axionlike dark matter

[Deniz Aybas et al., PRL **126,** 141802 (2021)]

EDM coupling: $H_{EDM} \propto \boldsymbol{\sigma} \cdot (a_0 \boldsymbol{E}^*) \cos(\omega_a t)$

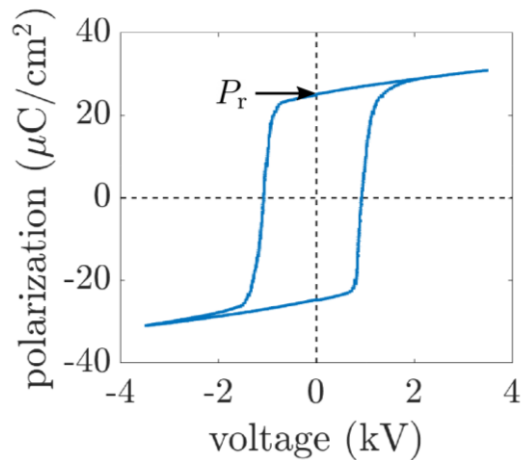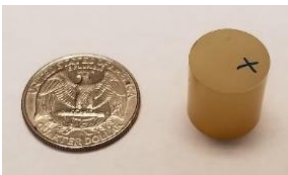Gradient coupling: $H_{grad} \propto \boldsymbol{\sigma} \cdot (\boldsymbol{\nabla} a_0) \cos(\omega_a t)$

$$H_{CASPEr} \propto \boldsymbol{\sigma} \cdot \boldsymbol{B_1^*} \cos(\omega_a t)$$

$$\hbar\omega_a = g\mu B_0$$

magnetometer (eg, SQUID or coil)

sample

B_0

M

$B_1^* \cos(\omega_a t)$

Using solid-state Nuclear Magnetic Resonance (NMR) to search for axionlike dark matter

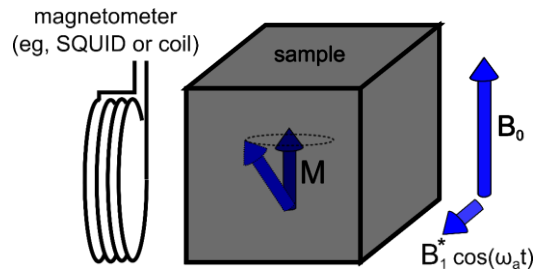^{207}Pb based PMN-PT ferroelectric crystal with large effective electric field

[Deniz Aybas et al., PRL **126,** 141802 (2021)]

Searching for axionlike dark matter with CASPEr-electric

EDM coupling: $H_{EDM} \propto \boldsymbol{\sigma} \cdot (a_0 \boldsymbol{E}^*)\cos(\omega_a t)$
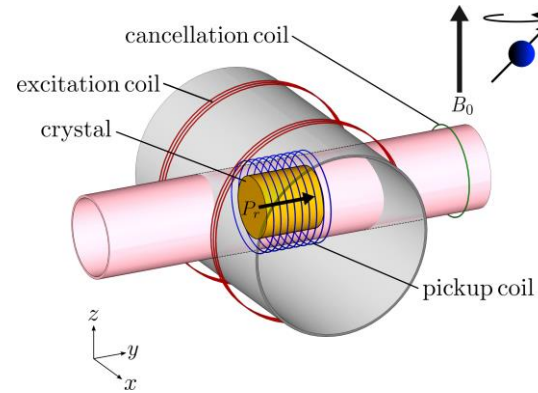
Gradient coupling: $H_{grad} \propto \boldsymbol{\sigma} \cdot (\boldsymbol{\nabla} a_0)\cos(\omega_a t)$

$$H_{CASPEr} \propto \boldsymbol{\sigma} \cdot \boldsymbol{B_1^*}\cos(\omega_a t)$$
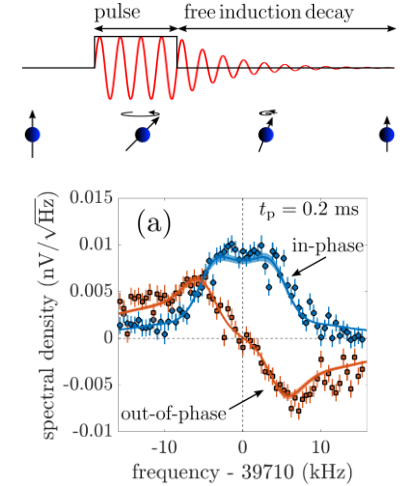
Pulsed NMR measurements for system calibration

$$\hbar\omega_a = g\mu B_0$$

Using solid-state Nuclear Magnetic Resonance (NMR) to search for axionlike dark matter

^{207}Pb based PMN-PT ferroelectric crystal with large effective electric field

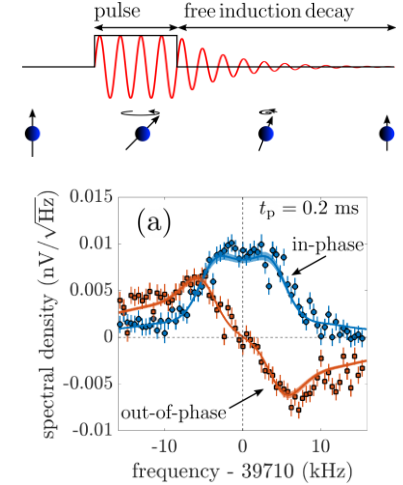[Deniz Aybas et al., PRL **126,** 141802 (2021)]

Searching for axionlike dark matter with CASPEr-electric

EDM coupling: $H_{EDM} \propto \boldsymbol{\sigma} \cdot (a_0 \boldsymbol{E}^*)\cos(\omega_a t)$

Gradient coupling: $H_{grad} \propto \boldsymbol{\sigma} \cdot (\boldsymbol{\nabla} a_0)\cos(\omega_a t)$
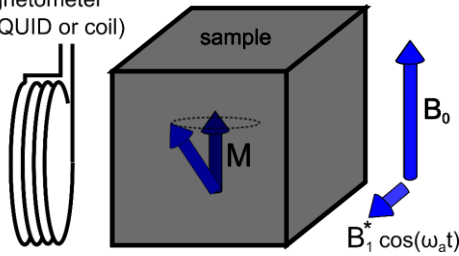
$$H_{CASPEr} \propto \boldsymbol{\sigma} \cdot \boldsymbol{B_1^*}\cos(\omega_a t)$$
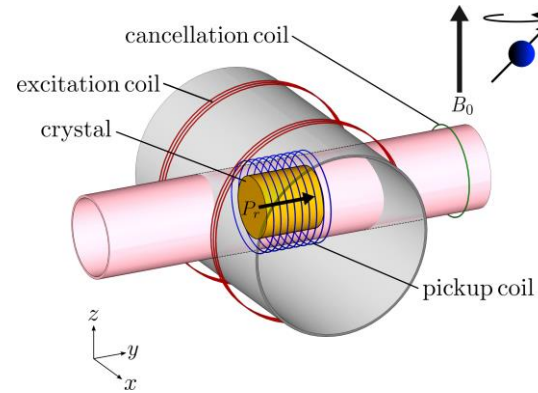
Pulsed NMR measurements for system calibration

$\hbar\omega_a = g\mu B_0$
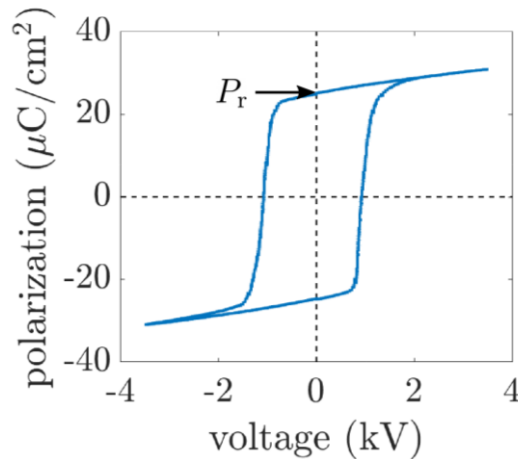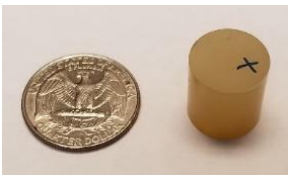
Using solid-state Nuclear Magnetic Resonance (NMR) to search for axionlike dark matter

^{207}Pb based PMN-PT ferroelectric crystal with large effective electric field

Axionlike dark matter search results

[Deniz Aybas et al., PRL **126,** 141802 (2021)]