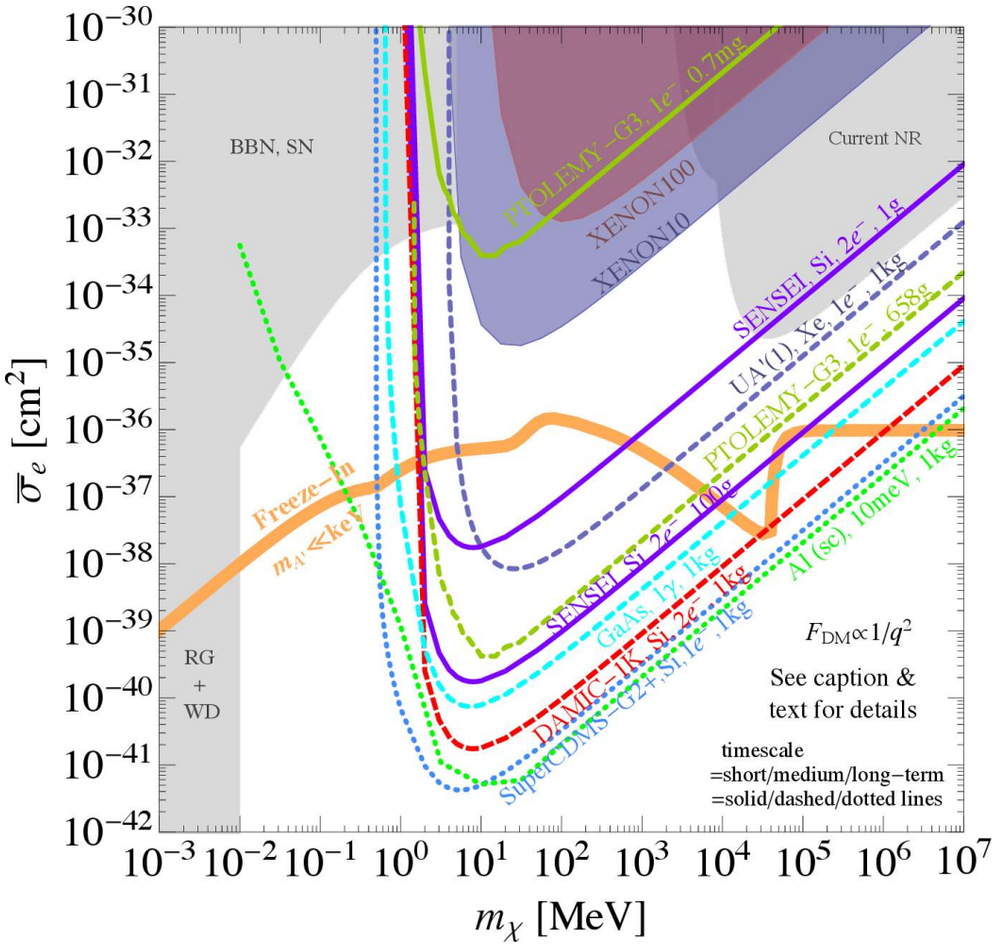
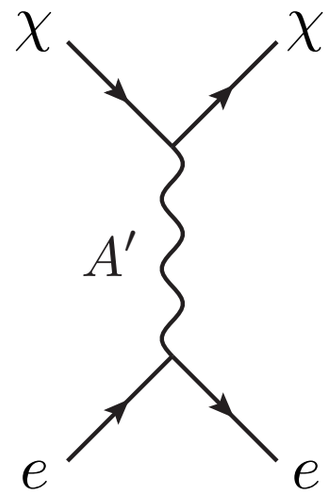
Direct Detection



<u>enhancement at very low momentum transfer</u>



$$\sigma(\chi e \to \chi e) \propto \frac{1}{q^4} \sim \frac{1}{(\alpha_{\rm em}\, m_e)^4}$$

For sub-MeV freeze-in DM, independent bounds imply light mediator/millicharge-like long-range force

$\Longrightarrow$

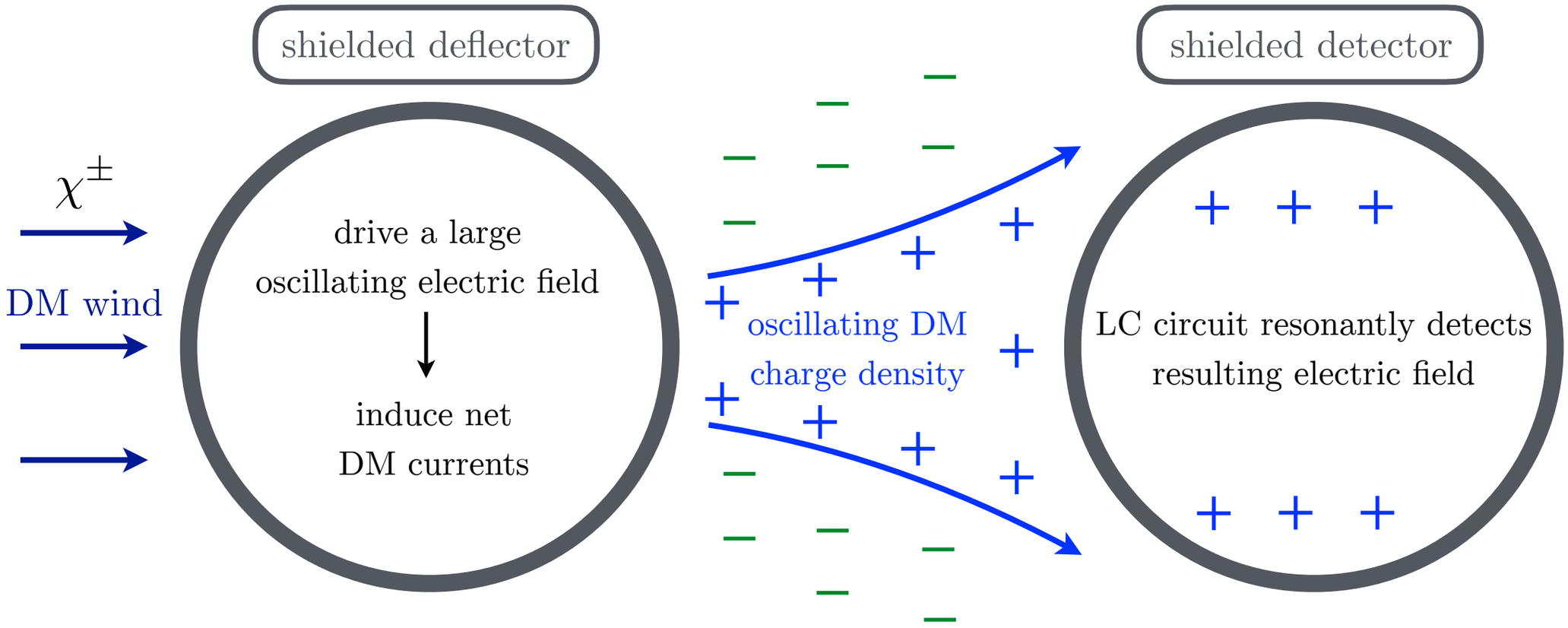
$$m_{A'} \lesssim 10^{-9}\ \text{eV} \sim \frac{1}{100\ \text{m}}$$

DM is "millicharged" on lab-scales

<u>What about even lower momentum transfers?</u>

(take advantage of the macroscopically long-ranged interaction)

Direct *Deflection* (Berlin et al. 1908.06982)



<u>Strength/Complementarity</u>

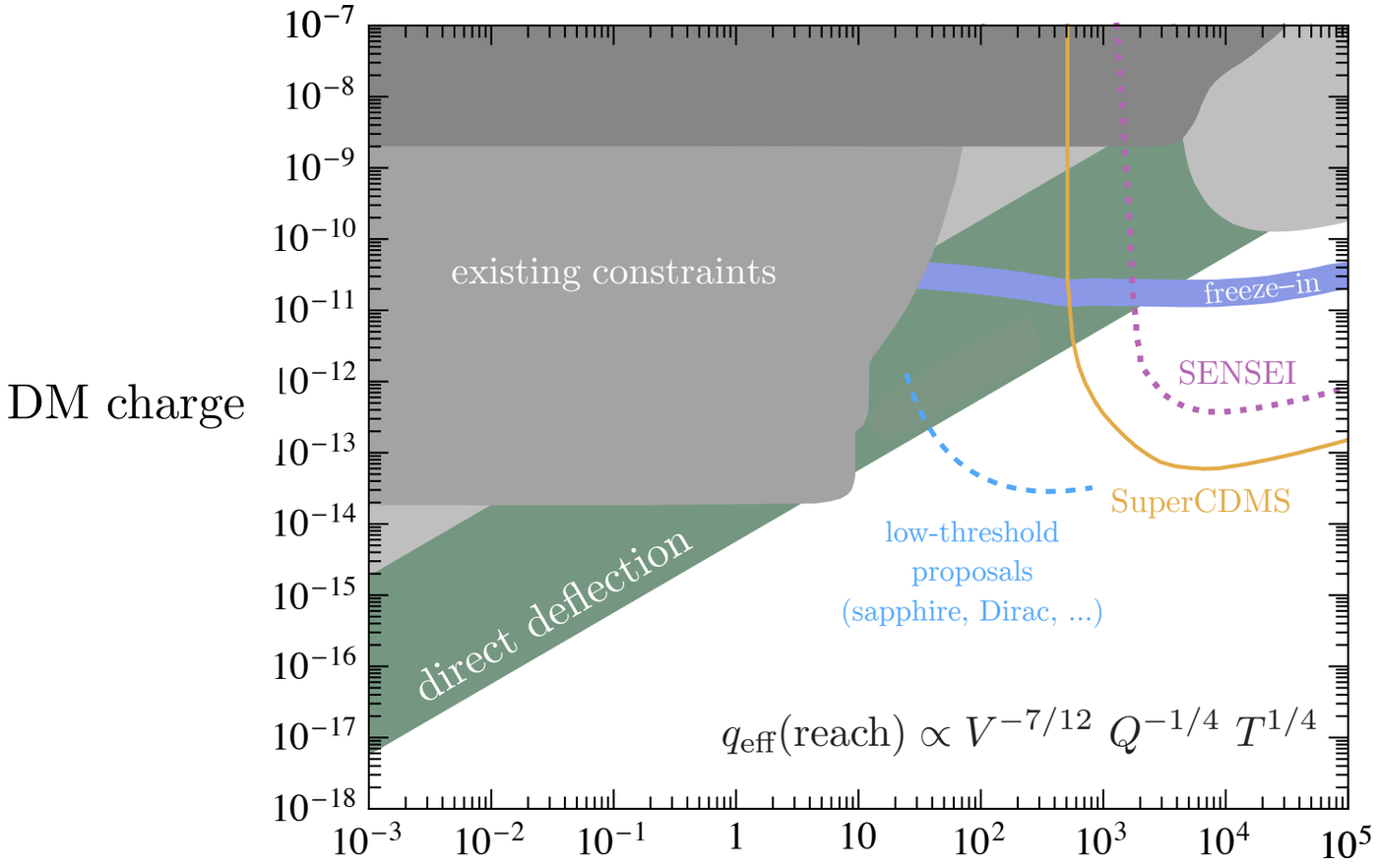
No kinematic barrier at small masses (signal exploits/collective effects, not scattering).

<u>Detector Requirements</u>

A deflector driven at ~10 kV/cm and 100 kHz (achievable without major R&D).

A high Q-factor LC circuit (similar to that used in DM Radio), optimized for electric-field pickup (requires R&D).

Direct *Deflection* (Berlin et al. 1908.06982)



Reach

New parameter space within reach (ultimate sensitivity) for

0.1 (10) m^3 volumes, 10^3 (10^7) Q-factors, and 4 K (100 mK) temperatures.