

Electron recoil in HPS

$$e + W \rightarrow e' + W' + A$$

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HPS Meeting

HPS kinematics

- Reaction:

$$e(p) + W(P_i) \rightarrow e'(p') + W(P_f) + A(k).$$

- Weizsacker-Williams approximation:

$$\sigma_{e+W \rightarrow e'+W'+A} = \Gamma_q \times \sigma_{e+\gamma(q) \rightarrow e'+A}$$

photon 4-momentum: $q = P_i - P_f$.

- Diffractive approximation:

$$q^0 \simeq 0 \text{ and } |\vec{q}| \simeq \frac{E_0}{E'} E_A (1 - \cos\theta_A)$$

final nucleus is off-mass shell.

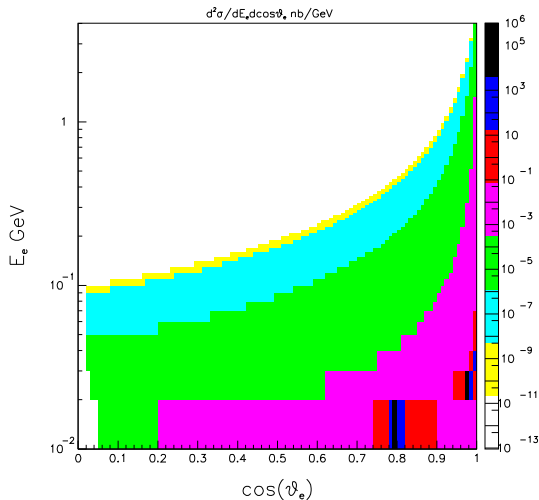
- Small parameters:

$$\frac{m_A}{E_A}, \frac{m_e}{E'}, \theta_A \text{ and } \frac{|\vec{q}|}{E'}$$

calculations are valid for $E_A \rightarrow E_0$, $\theta_A \rightarrow 0$ and $E' > E_0 \theta_A$

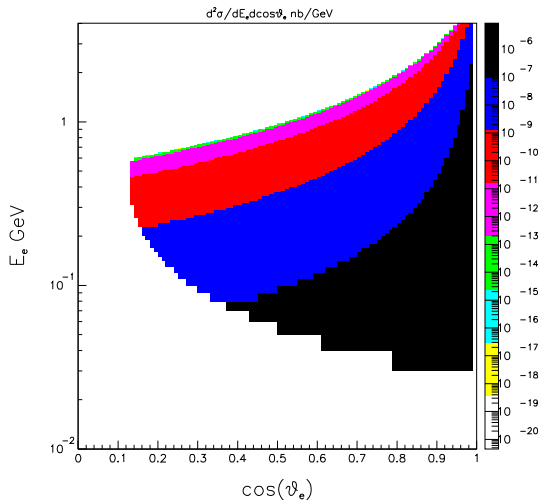
$$E_0 = 6.6 \text{ GeV}, m_A = 100 \text{ MeV}$$

- 50 MeV threshold ($R = 17 \text{ cm}$), acceptance = 10^{-6}



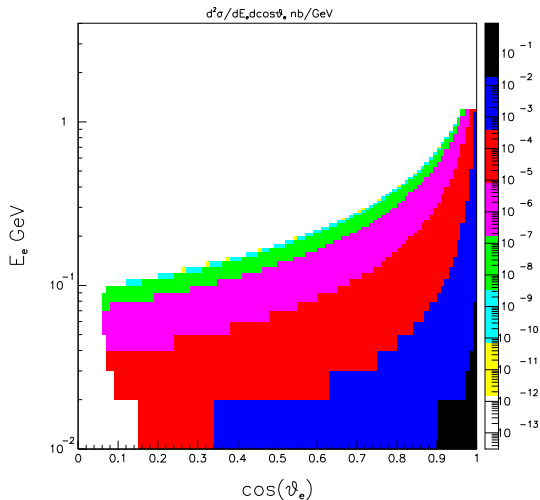
$$E_0 = 6.6 \text{ GeV}, m_A = 600 \text{ MeV}$$

- 50 MeV threshold ($R = 17 \text{ cm}$), acceptance = 0.9



$$E_0 = 2.2 \text{ GeV}, m_A = 100 \text{ MeV}$$

- 50 MeV threshold ($R = 17 \text{ cm}$), acceptance = 0.2



$$E_0 = 2.2 \text{ GeV}, m_A = 600 \text{ MeV}$$

- 50 MeV threshold ($R = 17 \text{ cm}$), acceptance = 1

