

# LC dynamics and EMC effects in the extraction of F2n

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## Deuteron Target for Extracting F2n

- Reliable model for calculating inclusive  $d(e,e')x$  cross section
- deuteron consists of proton and neutron
- motion of the nucleons in the deuteron
- DIS interaction off the moving nucleon
- Modification of the nucleon structure
- Nonnucleonic Degrees of Freedom

## **Ligh Cone Approach**

- **Natural Approach for Calculating Deep Inelastic Scattering off the nuclei**
- **partons themselves are defined in LC or infinite momentum frame**
- **If one assumes that nucleus consists of nucleons only , then light-cone approximation allows to conserve both Baryon and Momentum sum rules**

## Ligh Cone Approach

- this means that the nuclear density matrix should satisfy the following two sum rules

$$\int \rho(\alpha, p_t) \frac{d\alpha}{\alpha} d^2 p_t = 1$$

$$\int \alpha \rho(\alpha, p_t) \frac{d\alpha}{\alpha} d^2 p_t = 1$$

LC model Frankfurt Strikman, PR81

$$\rho_{lc} = \frac{\sqrt{m^2 + k^2} |\psi_D(k)|^2}{(2-\alpha)} \quad k = \sqrt{\left(\frac{m^2 + p_t^2}{\alpha(2-\alpha)} - m^2\right)}$$

## Virtual Nucleon Approximation

- It is possible to satisfy only the Baryon sum rule

$$\int \rho(\alpha, p_t) \frac{d\alpha}{\alpha} d^2 p_t = 1$$

$$\int \alpha \rho(\alpha, p_t) \frac{d\alpha}{\alpha} d^2 p_t < 1$$

$$\rho(\alpha, p_t) = \frac{M_D |\psi_D(p)|^2}{2(m_D - \sqrt{m^2 + p^2})}$$

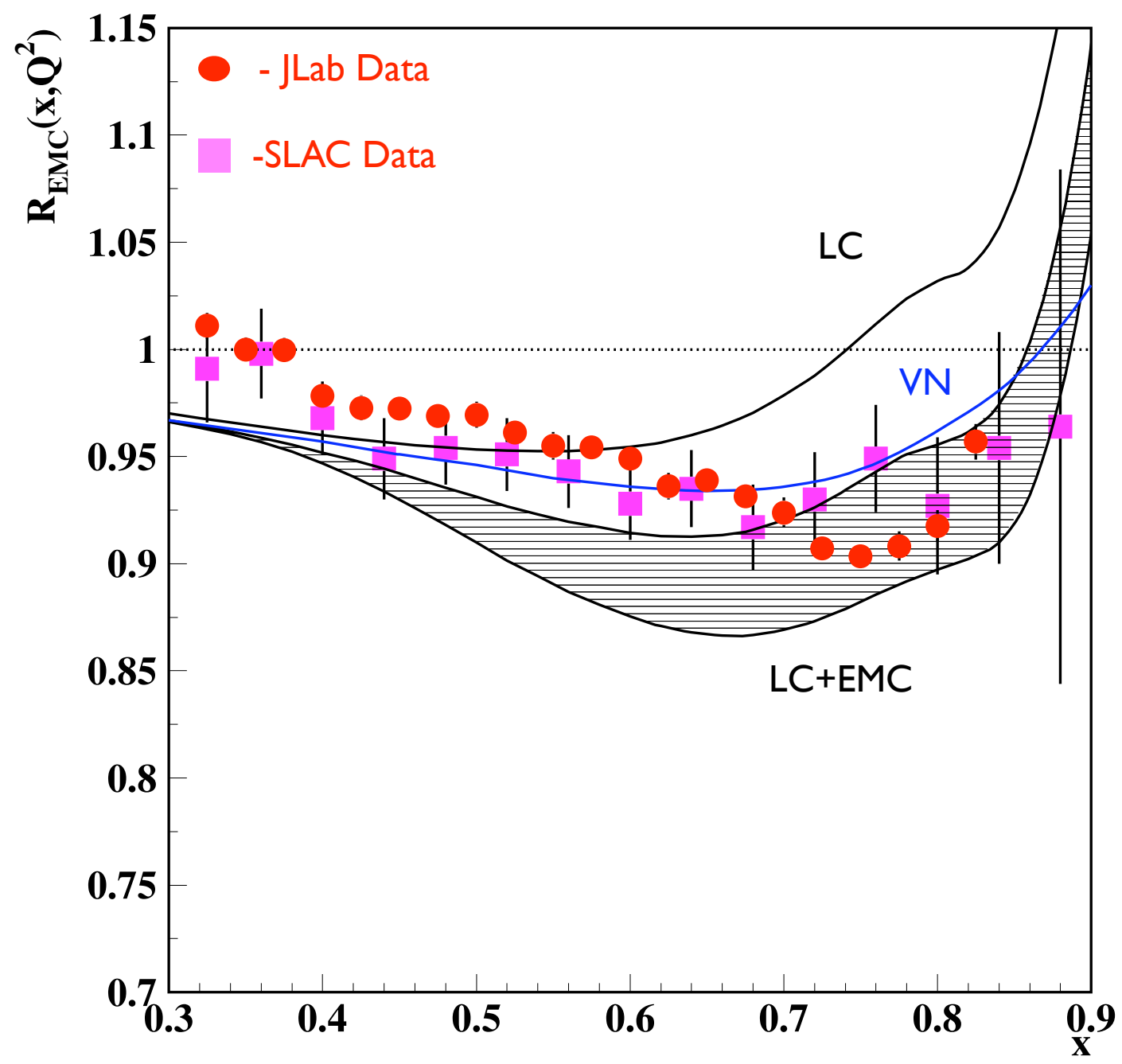
## F2 and momentum sum rule

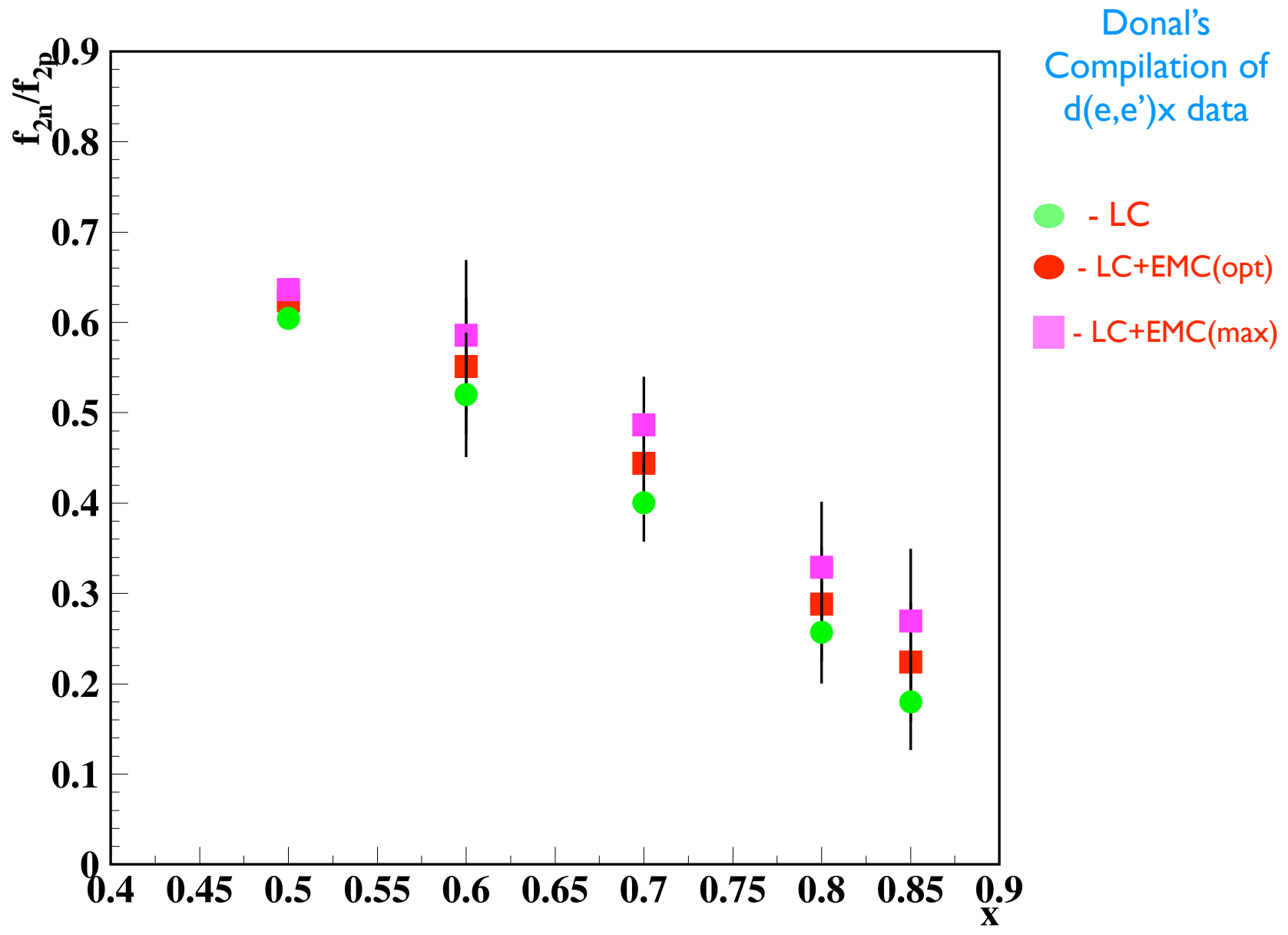
$$F_{2A} = \sum_{N=1}^A \int_x^A F_{2N}\left(\frac{x}{\alpha}\right) \cdot \rho(\alpha, p_t) \frac{d\alpha}{\alpha} d^2 p_t$$

$$F_{2N} \sim \left(1 - \frac{x}{\alpha}\right)^{-n}$$

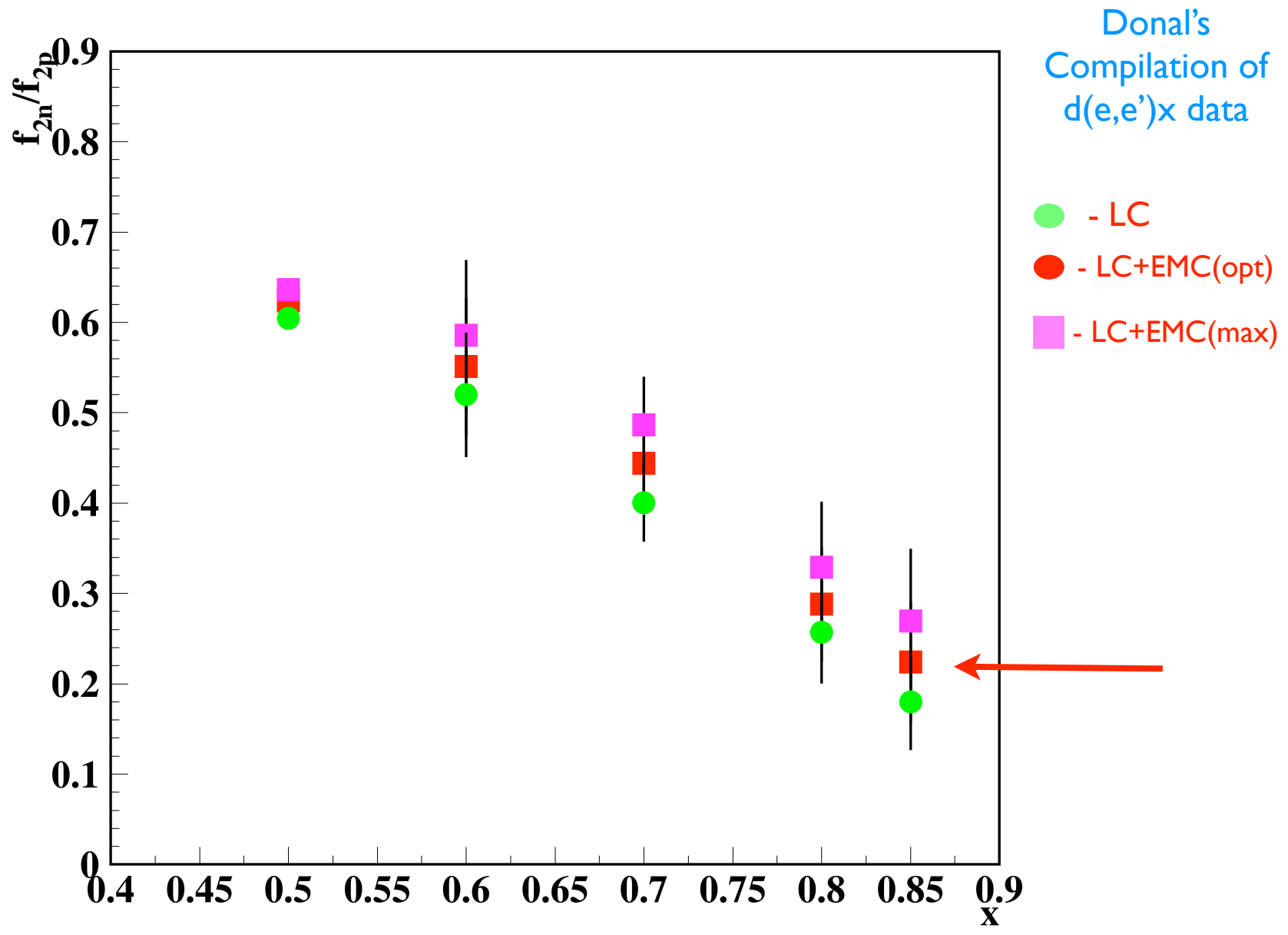
**violation of one of the sum rules imitates EMC effect**

4He4









## Some Conclusion and Outlook

- Understanding EMC effect is essential for  $F_2^n$
- Using EMC data for lightest nuclei for which realistic wave functions are known could allow to confine the EMC models that can be used as an input for extraction  $F_2^n$