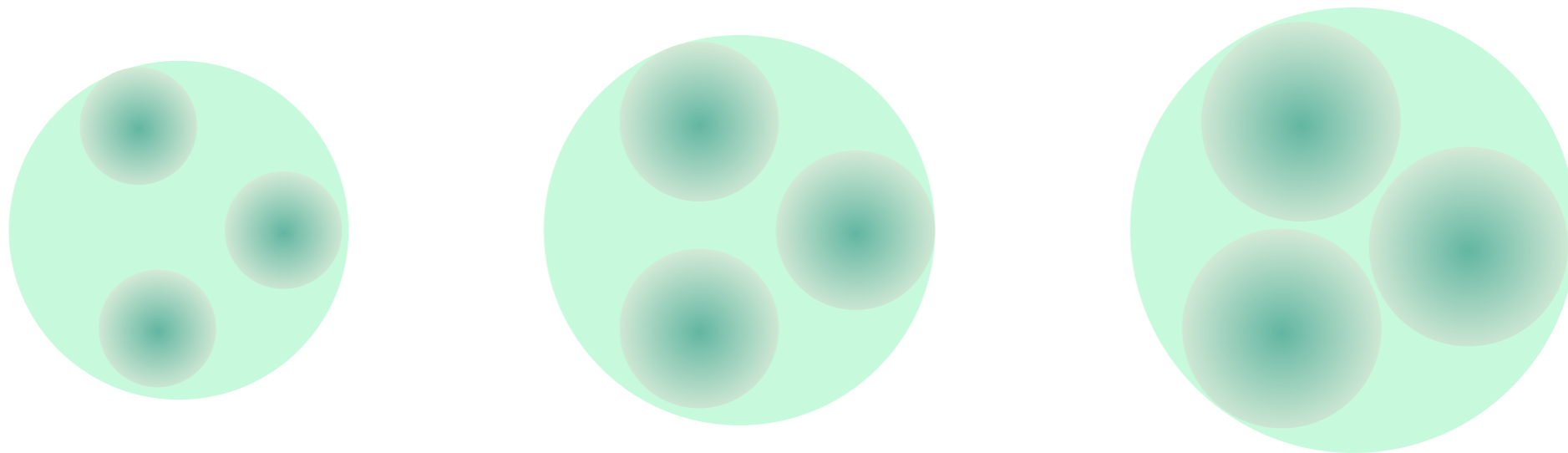


# GLUONIC HOT SPOTS AND SPATIAL CORRELATIONS INSIDE THE PROTON



Alba Soto-Ontoso<sup>1,2</sup>

+ Hannah Petersen<sup>1</sup>, Javier L. Albacete<sup>2</sup>

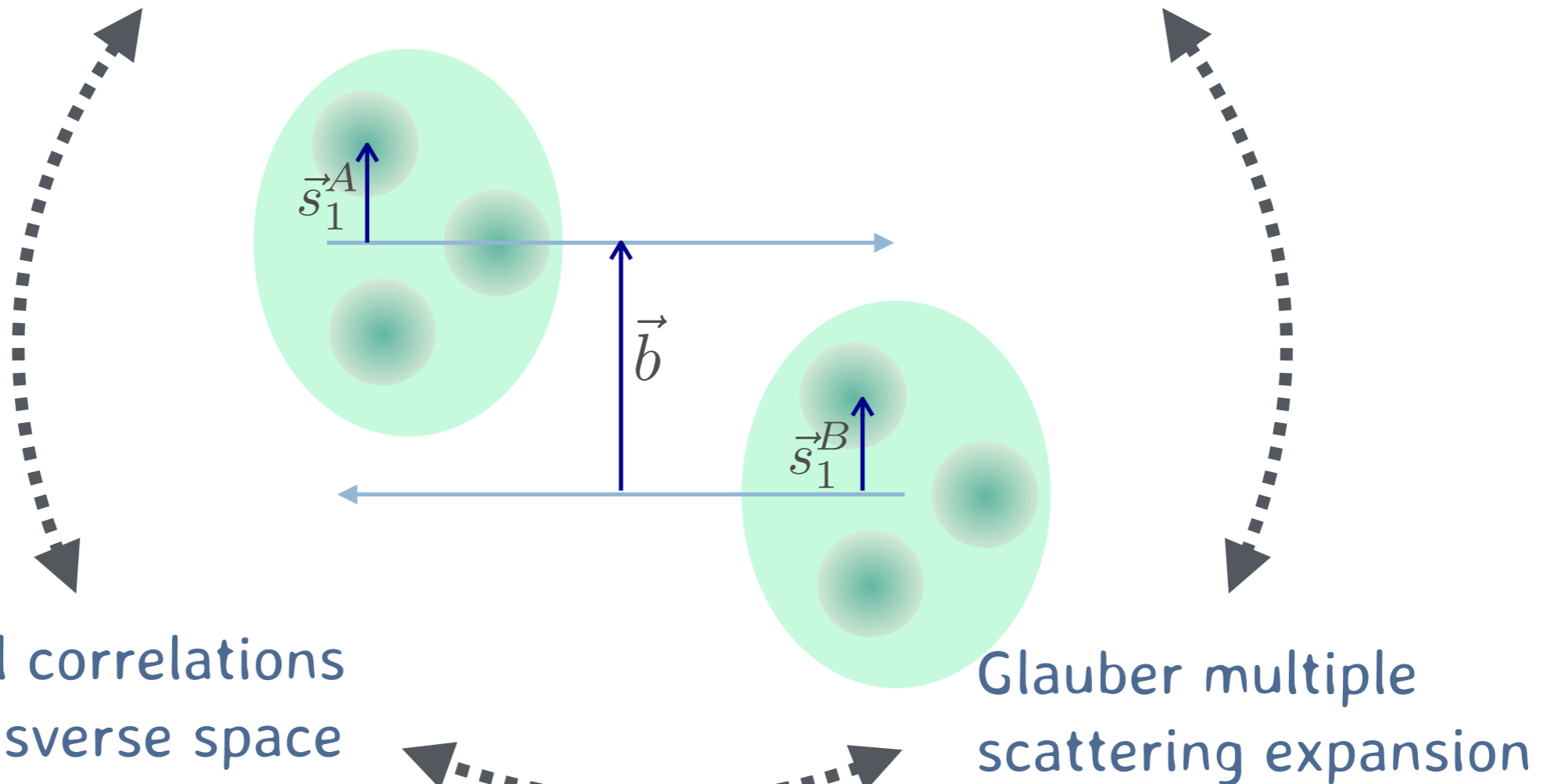
based on arXiv: 1605.09176, 1612.06274 [hep-ph]

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# What?

➔ A novel initial state geometry for proton-proton interactions based on:

Gluonic hot-spots as effective d.o.f



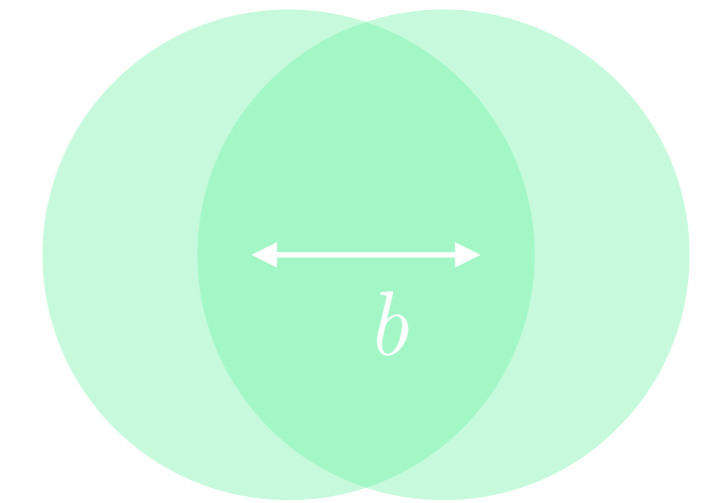
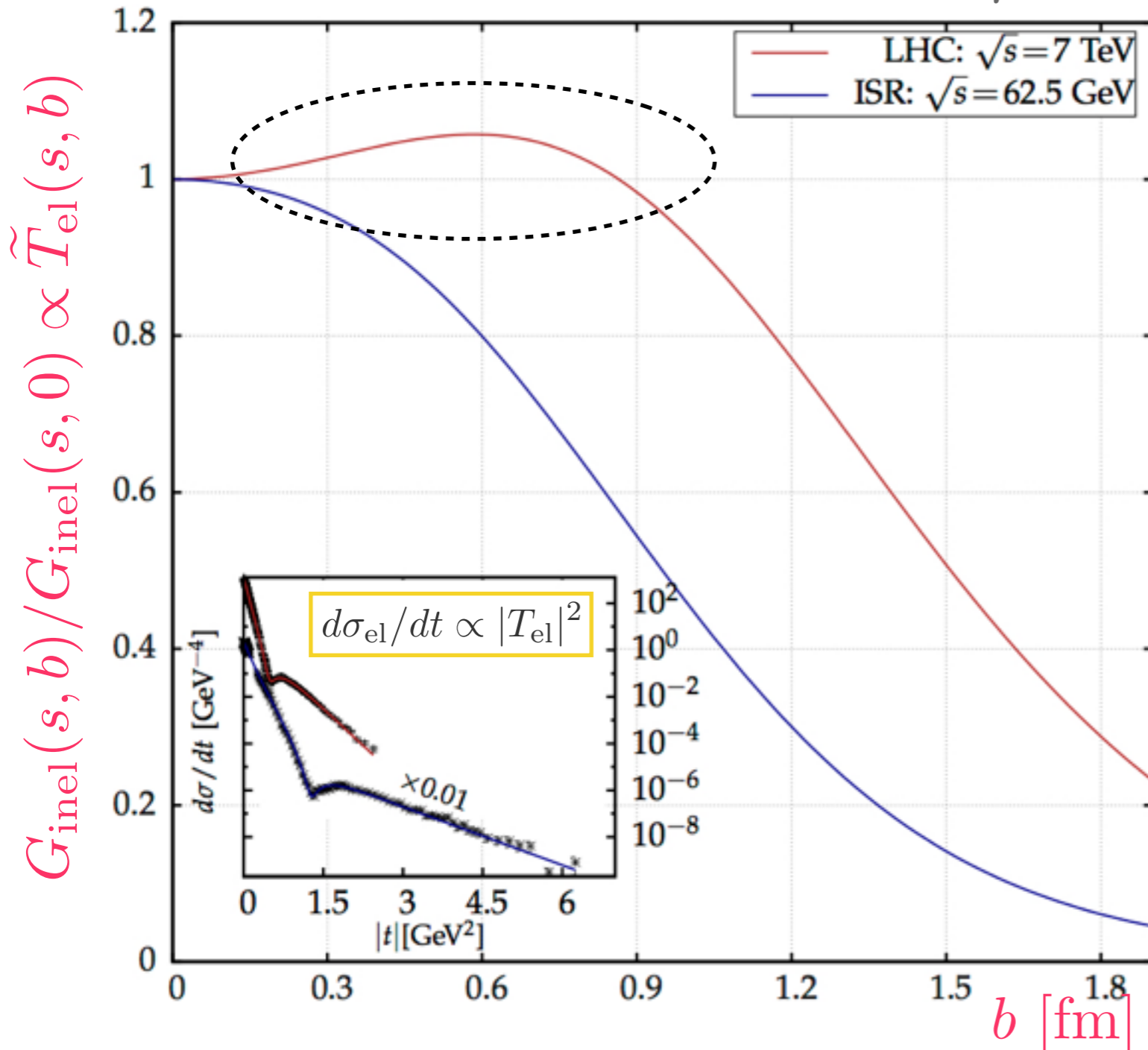
$$D(\vec{s}_1, \vec{s}_2, \vec{s}_3) = C \prod_{i=1}^3 e^{-s_i^2/R^2} \delta^{(2)}(\vec{s}_1 + \vec{s}_2 + \vec{s}_3) \times \prod_{\substack{i < j \\ i, j=1}}^3 \left( 1 - e^{-\mu |\vec{s}_i - \vec{s}_j|^2 / R^2} \right)$$

uncorrelated      fixes C.o.M      Repulsive correlations

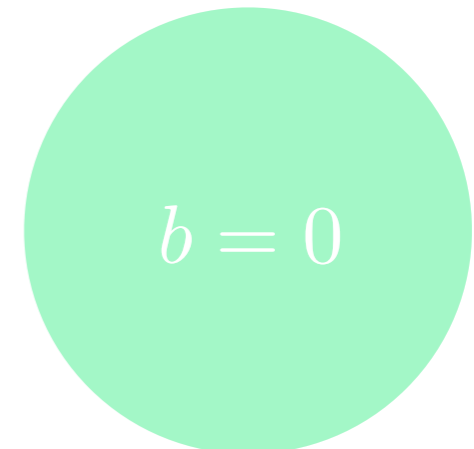
# Why?

Hollowness: Alkin et Al.'14, Arriola&Broniowski'16, Dremin'16, Troshin et Al.' 16...

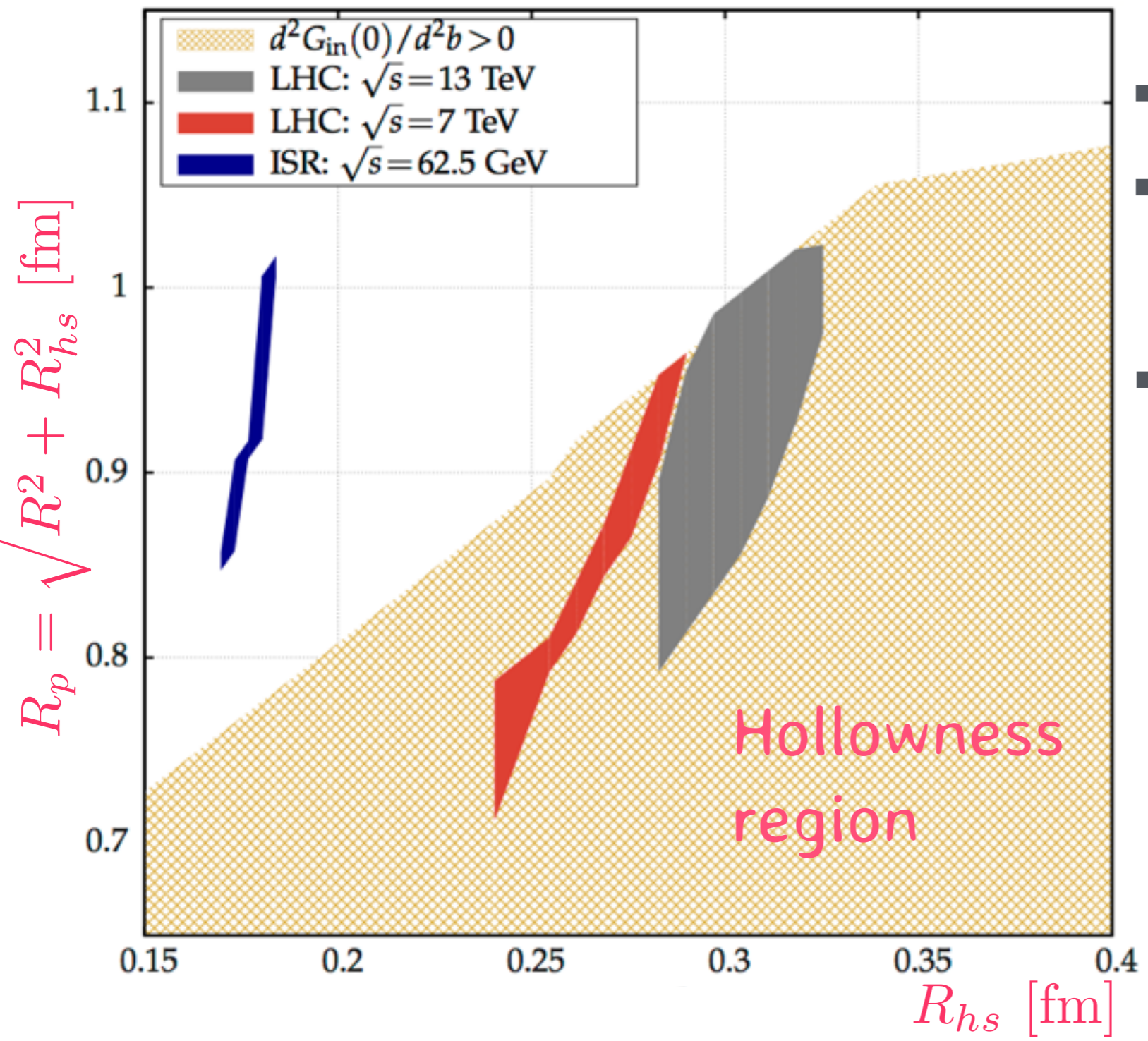
- ➔ Other proton models include correlations: quark-diquark, baryon junction.
- ➔ Correlations are essential for description of the hollowness effect @LHC7.



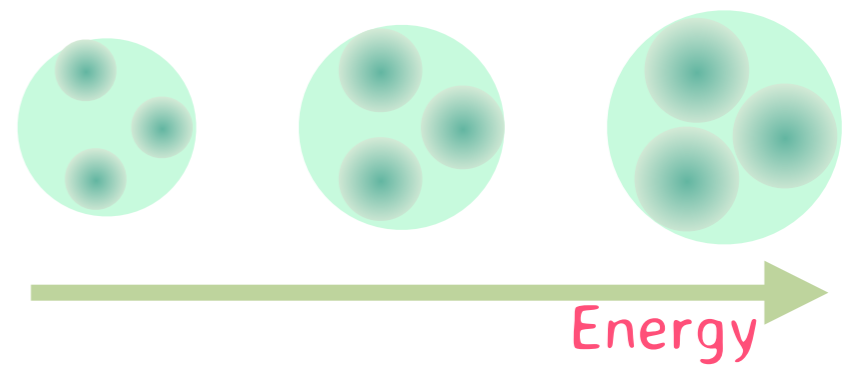
contributes more to  $\sigma_{\text{inel}}$  than



Parameters  $\{R_{hs}, R, \mu, \rho_{hs}\}$

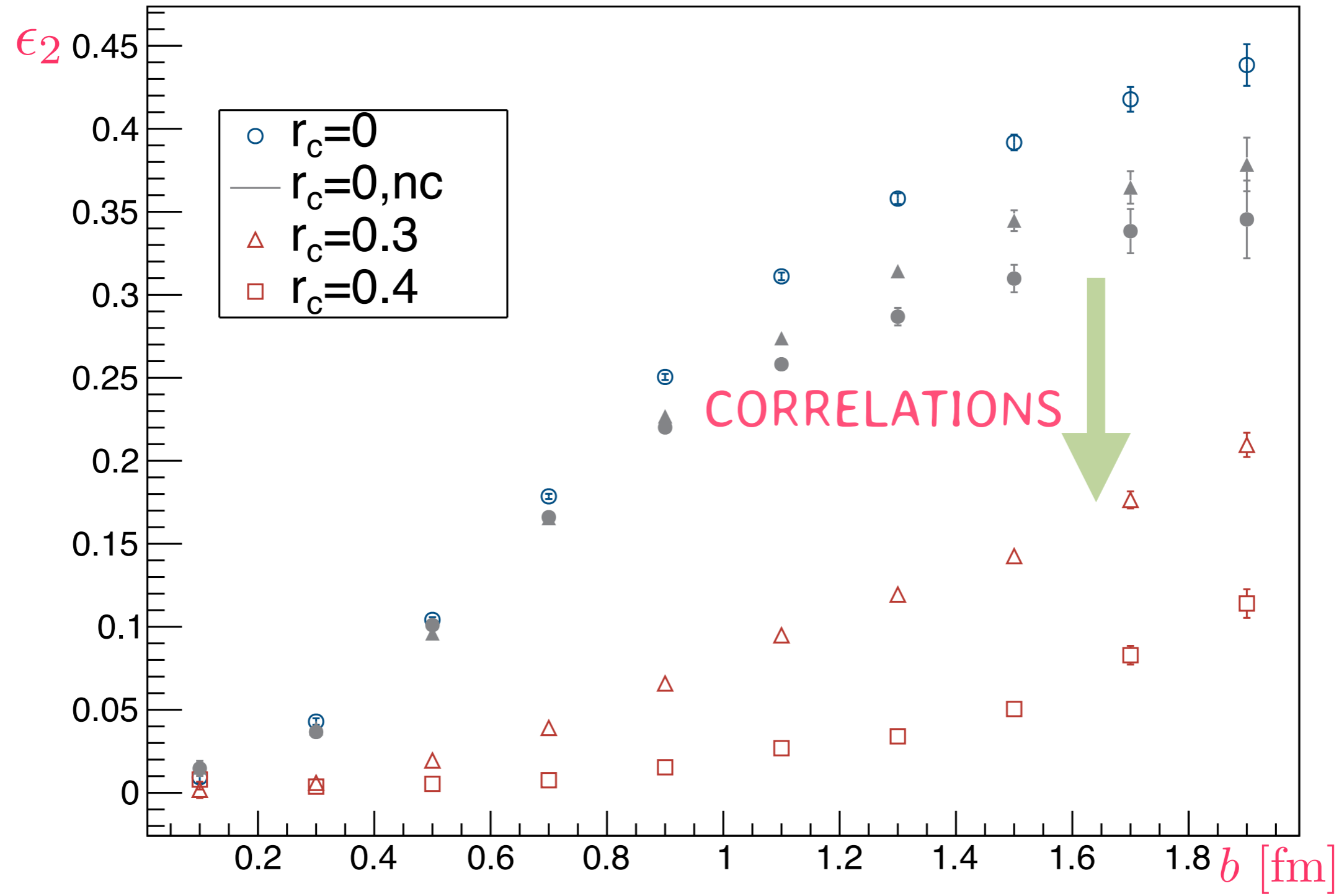


- ➔ It works with  $N_{hs} \geq 3$
- ➔ In the absence of non-trivial correlations, no hollowness effect.
- ➔ Transverse diffusion of  $R_{hs}$  as the main dynamical mechanism for:
  - ★ Onset hollowness effect
  - ★ Growth of  $\sigma_{tot}$  with  $\sqrt{s}$



# Results

➔ Spatial correlations among subnucleonic d.o.f reduce  $\epsilon_2$  in proton-proton



➔ Future: initial condition for hydrodynamic evolution & extension to pA, AA