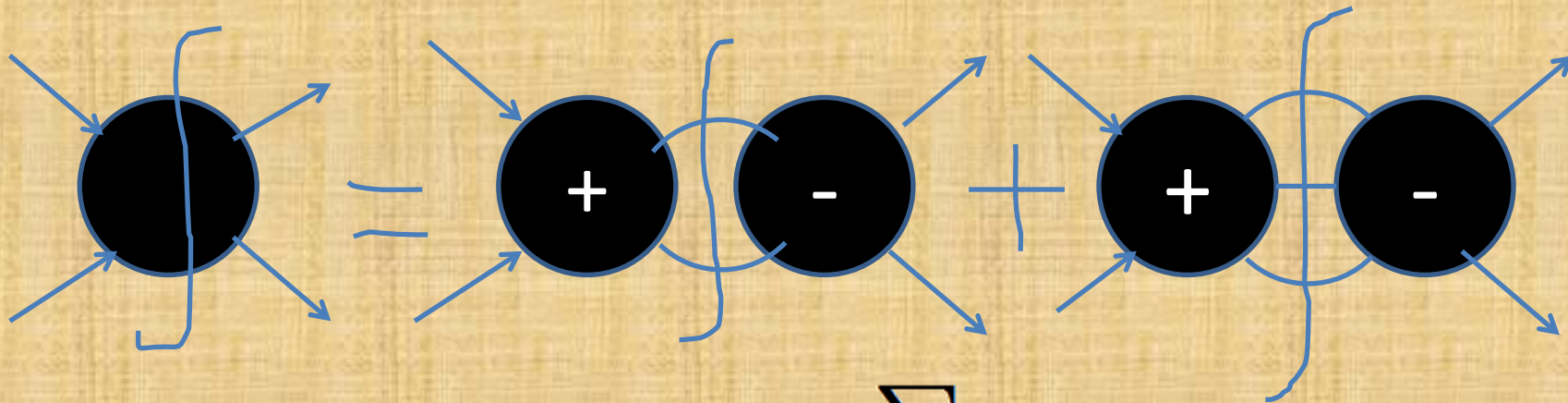


Is There a Hollow Inside the Proton ?



A. A. Logunov Institute for High Energy Physics
RRC "Kurchatov Institute", Protvino, RF

Unitarity

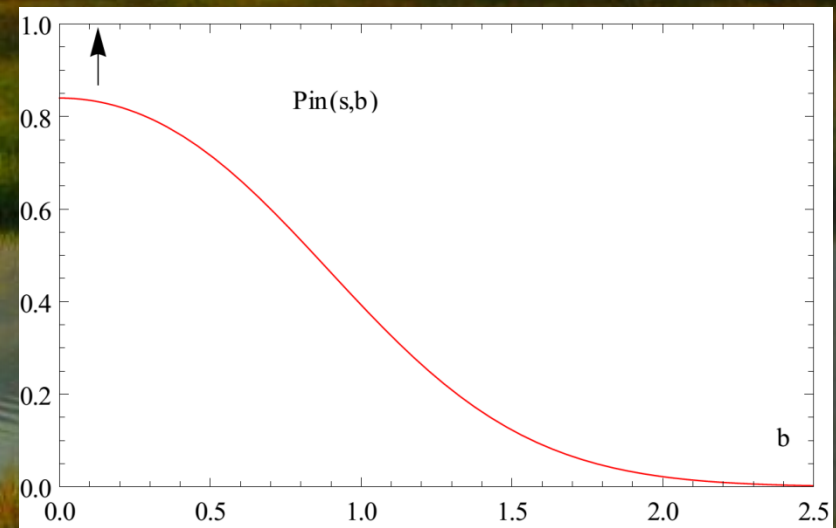
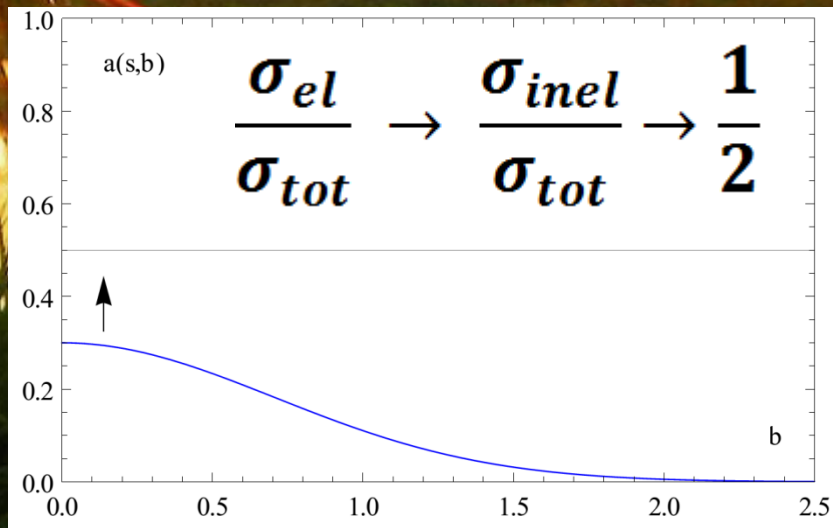
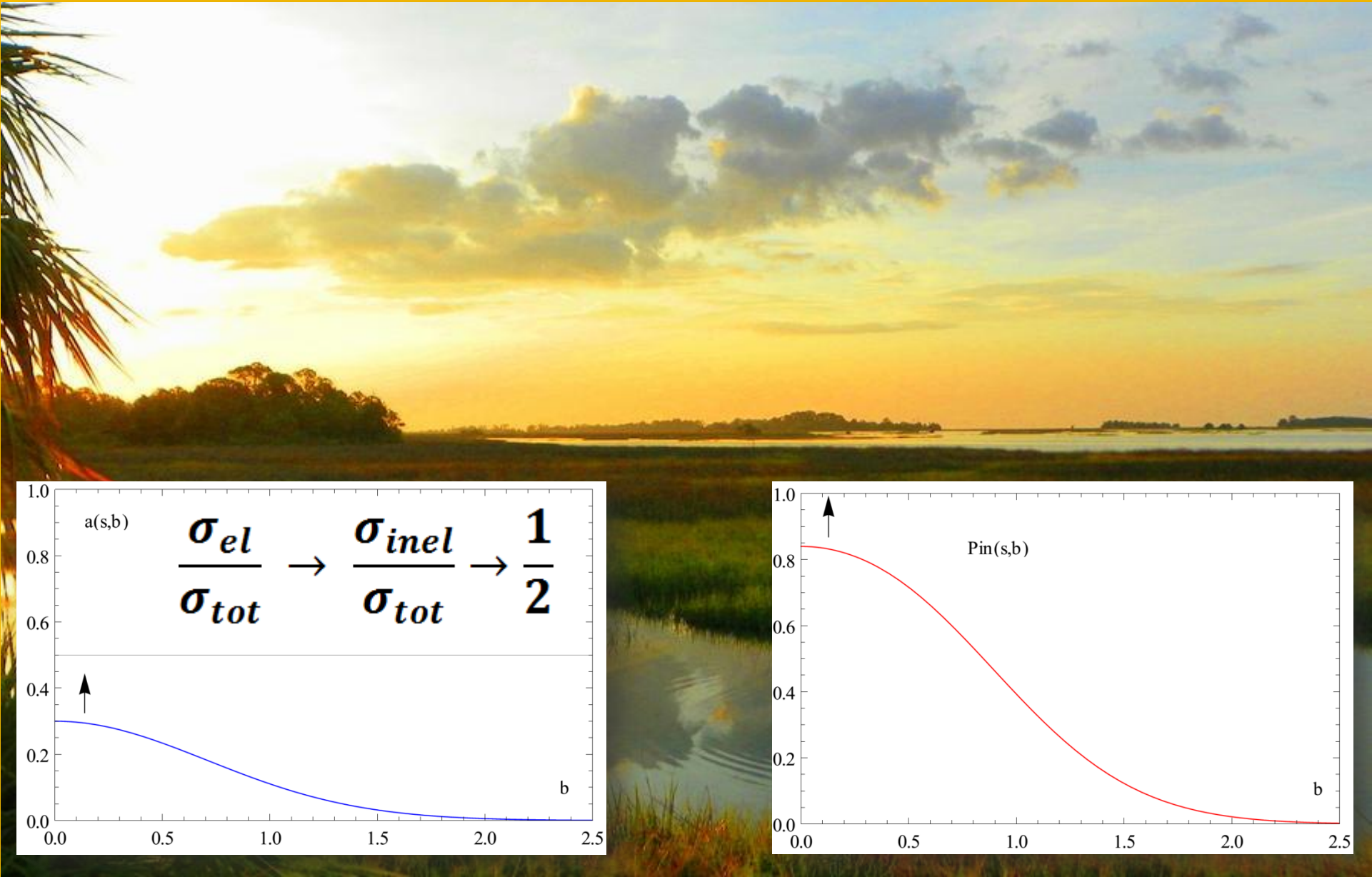


$$\text{Im } A(s, b) = |A(s, b)|^2 + \underbrace{\sum_X |A_X(s, b)|^2}_{\eta(s, b)}$$

Probability of inelastic events:

$$0 \leq P_{inel} = 4\eta(s, b) \leq 1$$

Standard Scenario: $a(s,b) \rightarrow \frac{1}{2}$; $P_{inel}(s,b) \rightarrow 1$



CALCULUS DIFFERENTIALIS

$$A(s,b) = \operatorname{Re} A(s,b) + i \operatorname{Im} A(s,b)$$

$$\operatorname{Re} A(s,b) \ll \operatorname{Im} A(s,b) \longrightarrow a(s,b)$$

$$A(s,b) \approx i a(s,b)$$

Unitarity

$$a(s,b) = a^2(s,b) + \eta(s,b)$$

$$P_{inel}(s,b) = 4\eta(s,b) = 4a(s,b)(1 - a(s,b))$$

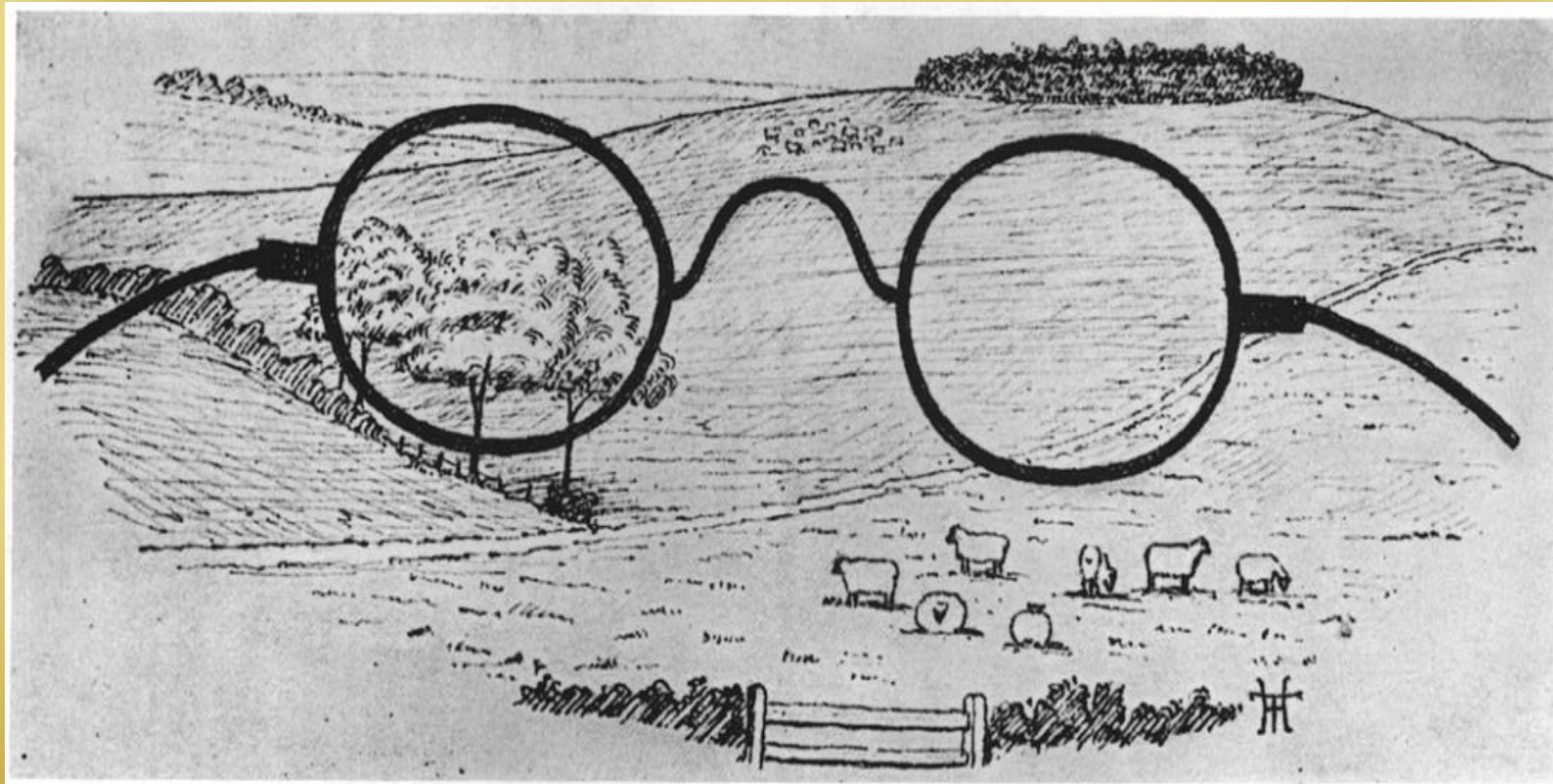
“Data”: $\frac{\partial a(s,b=0)}{\partial s} > 0$;

$$\frac{\partial P_{inel}(s,b=0)}{\partial s} = 4(1 - 2a(s,b=0)) \frac{\partial a(s,b=0)}{\partial s}$$

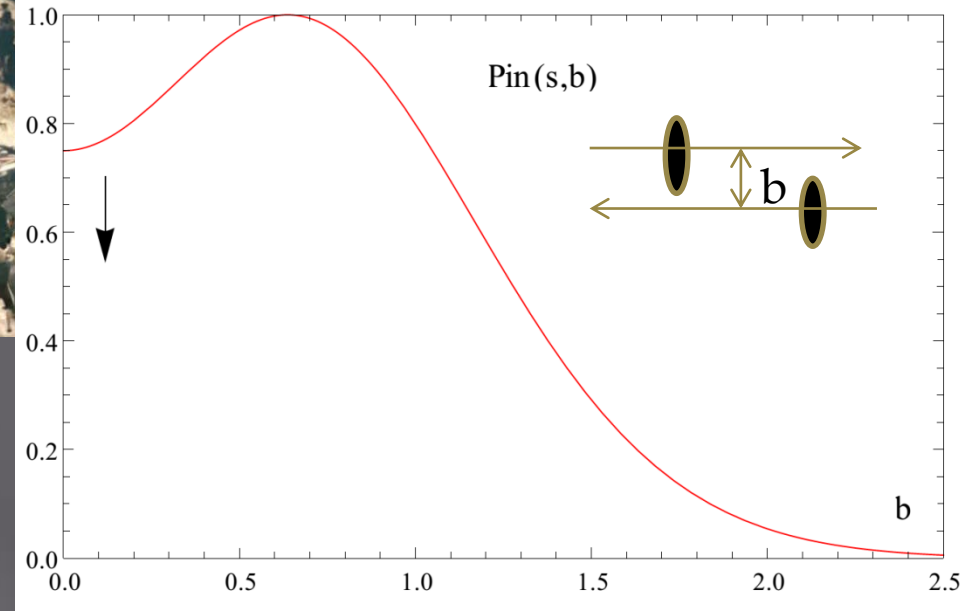
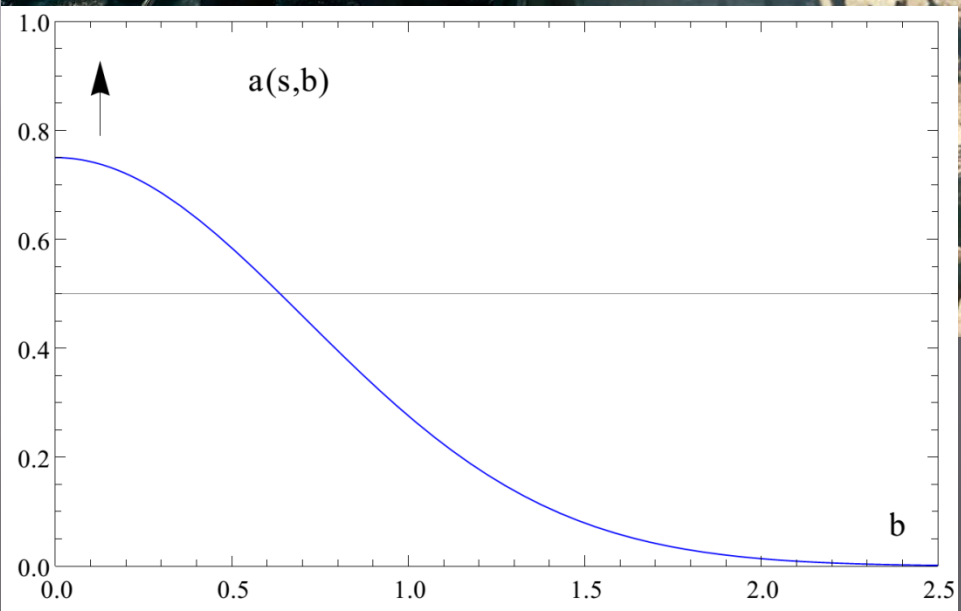
$$\frac{\partial P_{inel}}{\partial b^2}(s,b=0) = 4(2a(s,b=0) - 1) \frac{\partial a}{\partial b^2}(s,b=0)$$

$$a_{\text{critical}}(s,b) = \frac{1}{2} ?$$

New Look



Digging Up a Hollow?





Phys.Lett. B770 (2017) 149-153

Hot spots and the hollowness of proton-proton interactions at high energies

Javier L. Albacete, Alba Soto-Ontoso

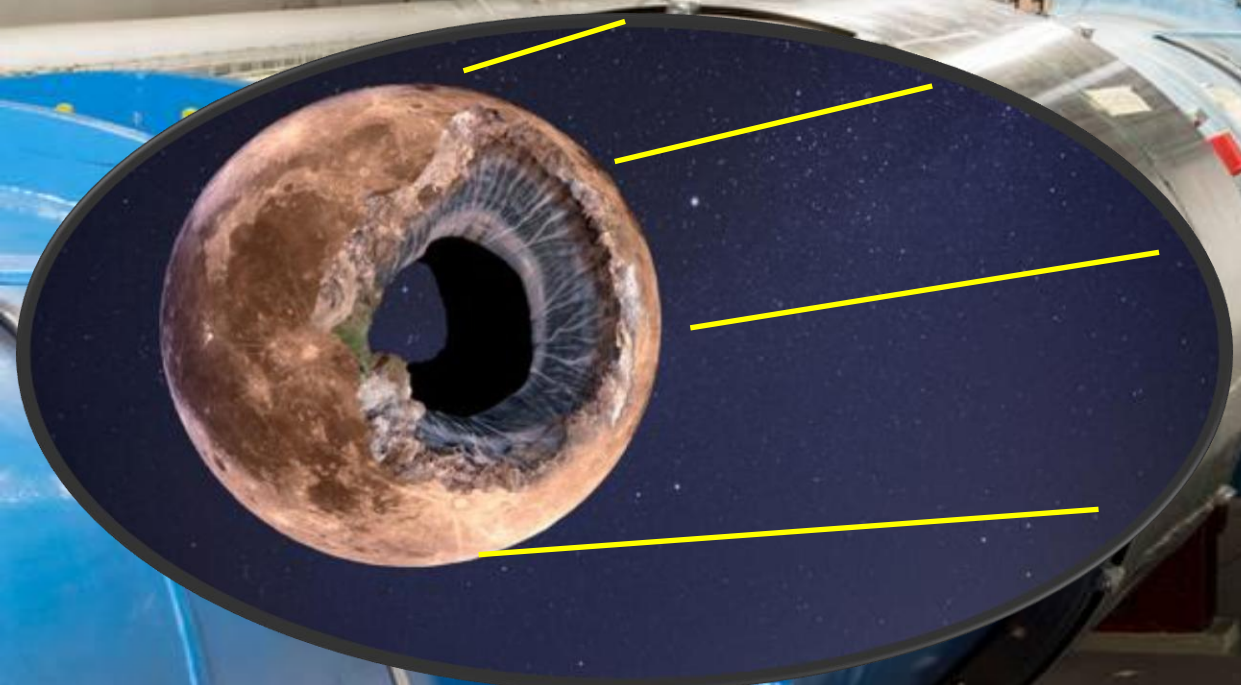
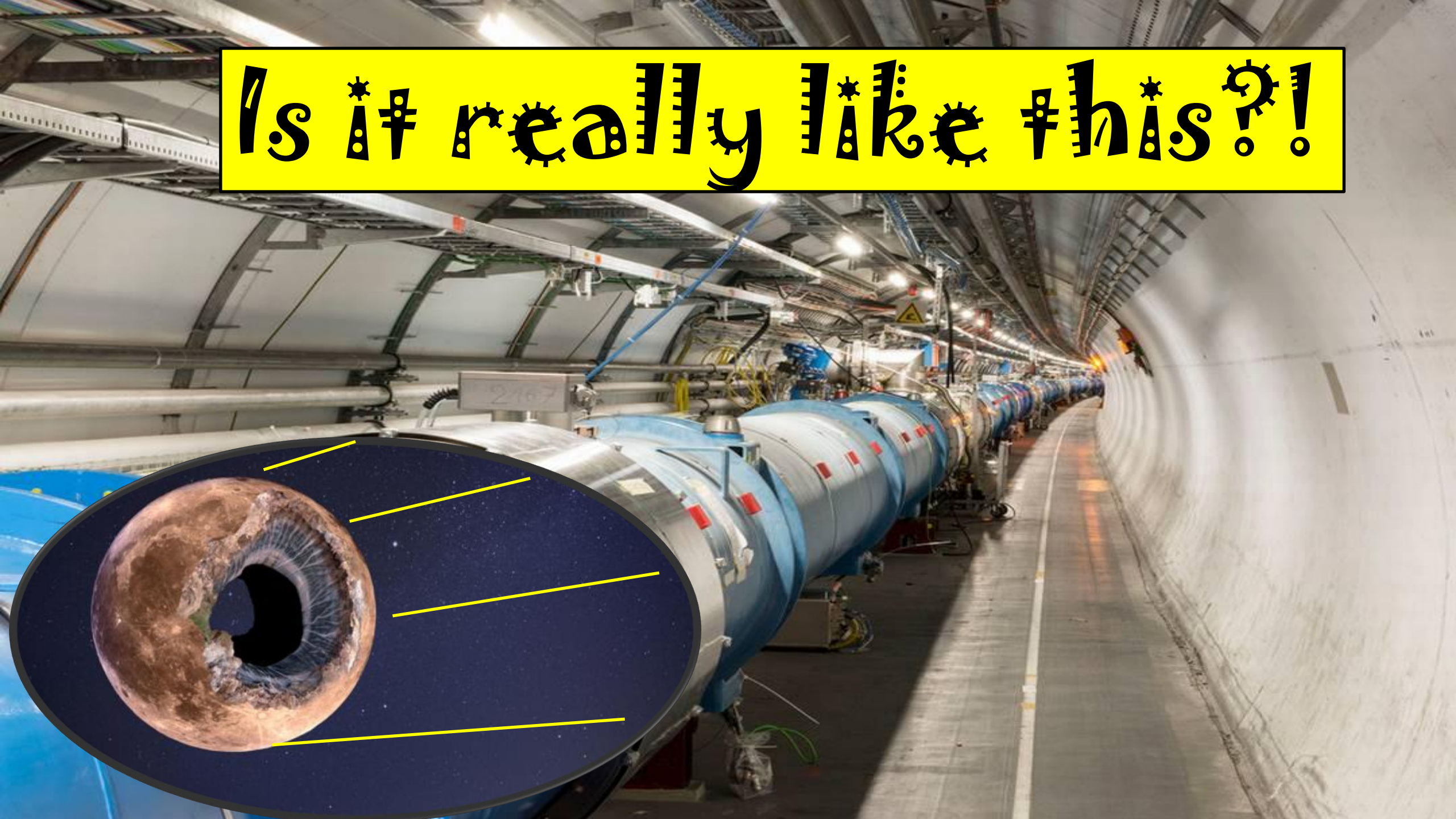


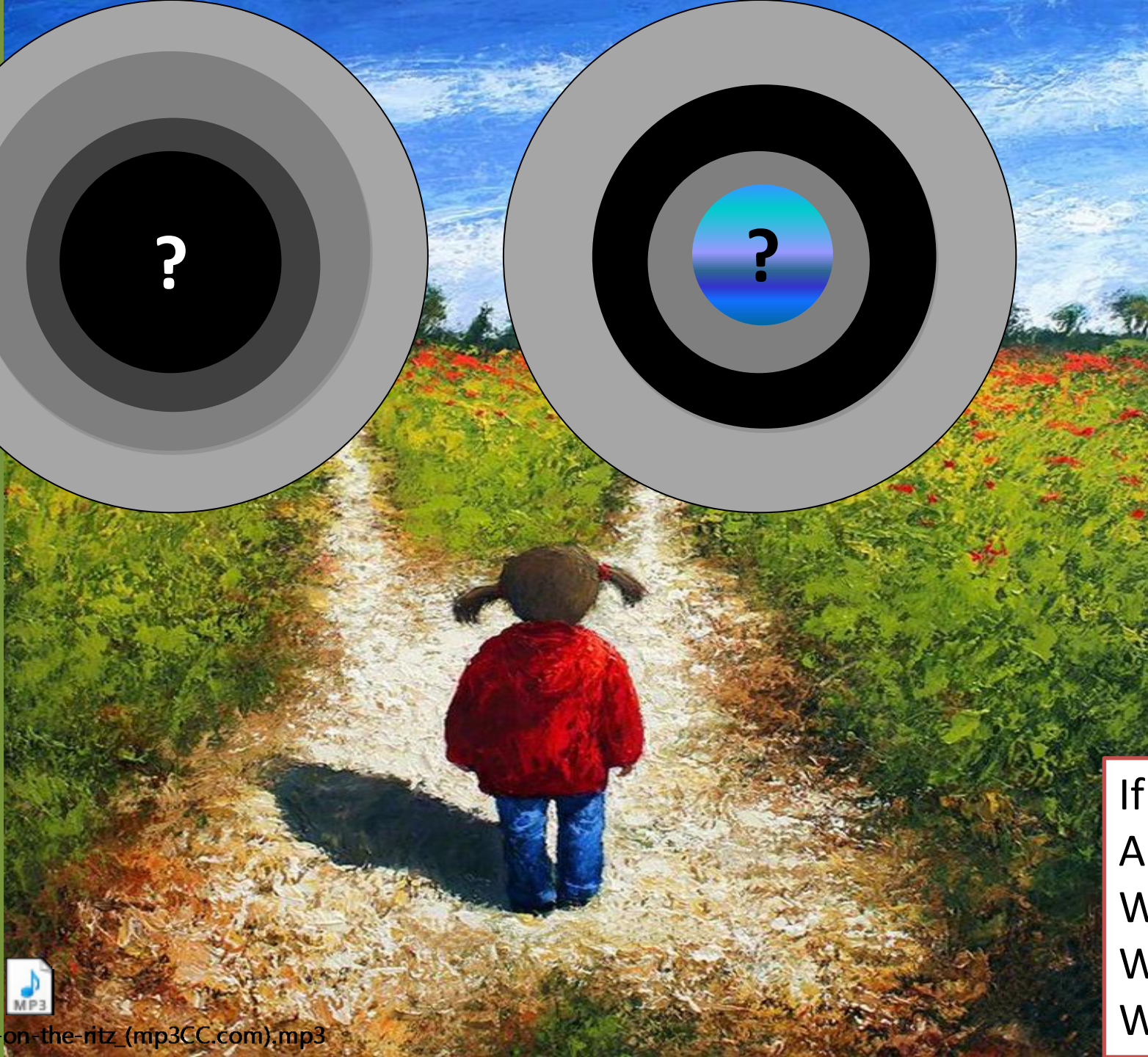
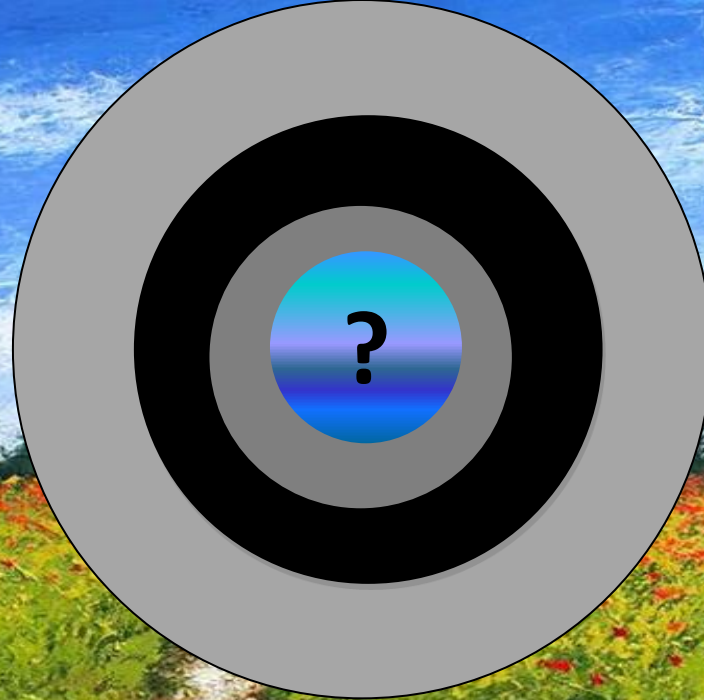
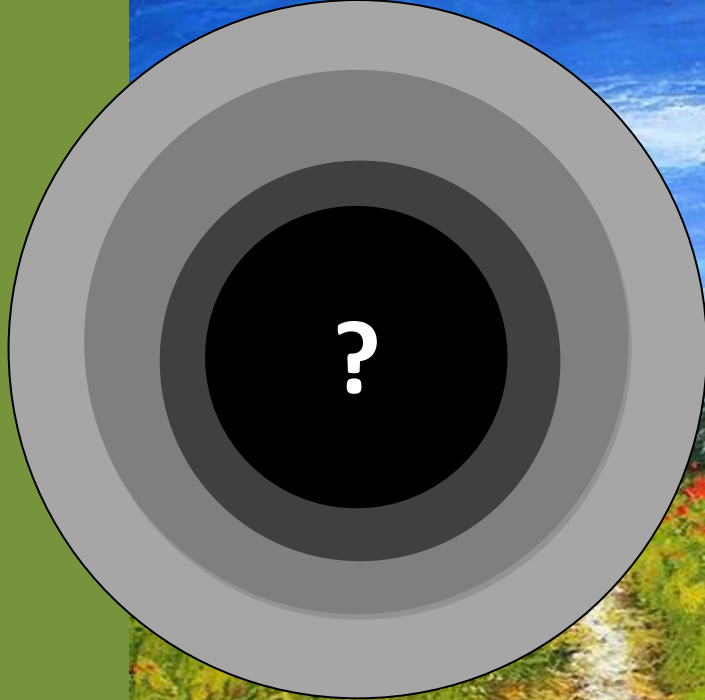
23rd Cracow Epiphany Conference on Particle Theory Meets
the First Data from LHC Run 2

Hollowness in pp scattering* **

WOJCIECH BRONIEWSKI^{1,2†} AND ENRIQUE RUIZ ARRIOLA³

Is it really like this?!

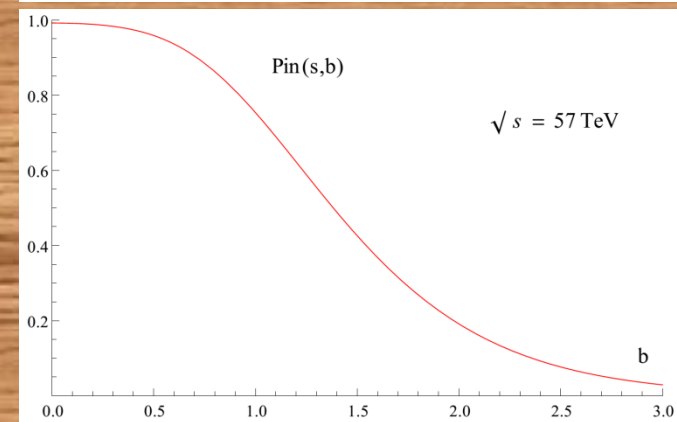
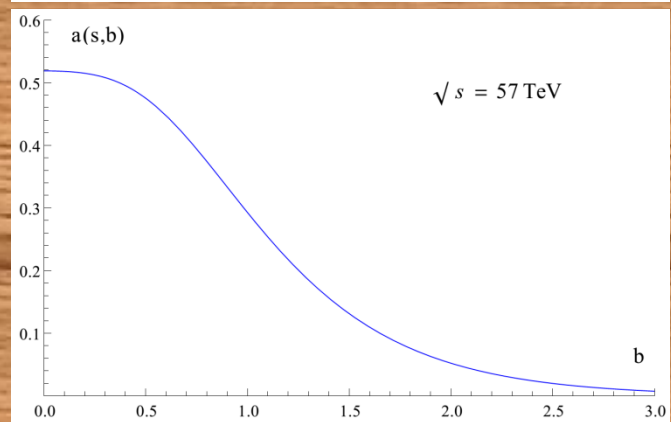
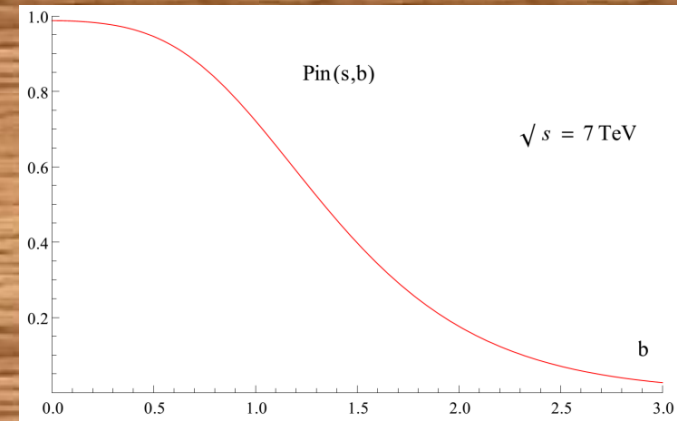
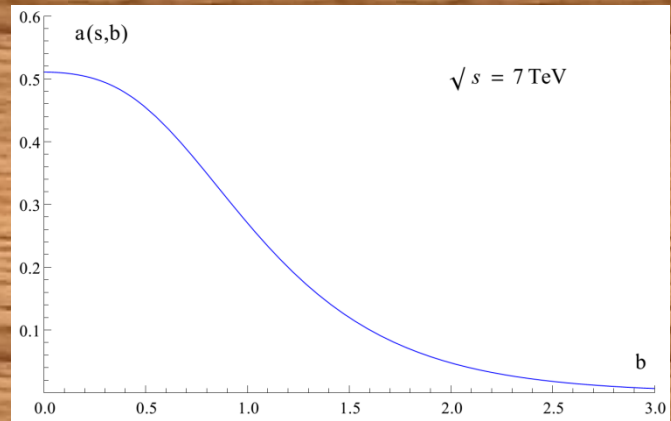
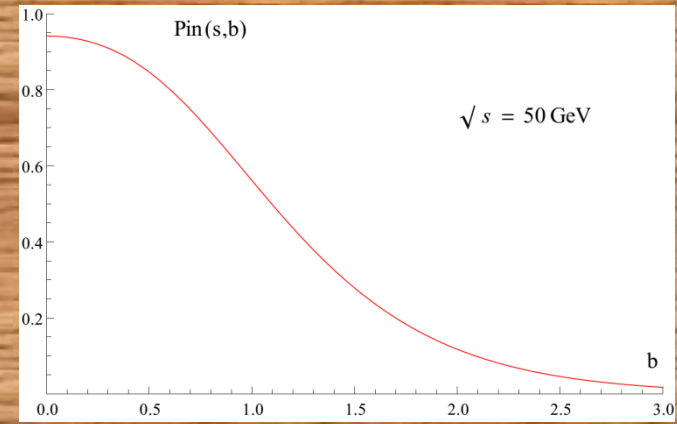
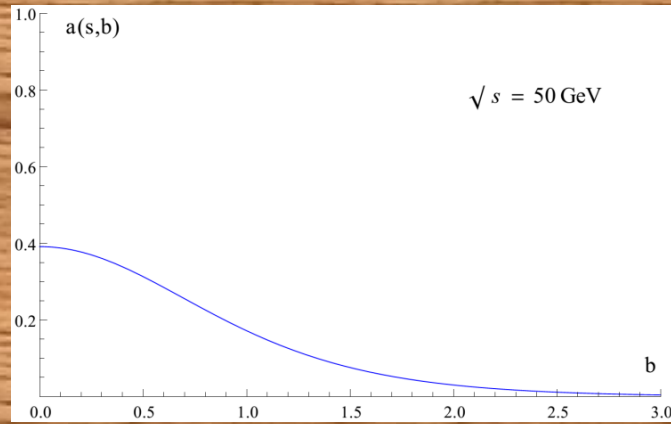




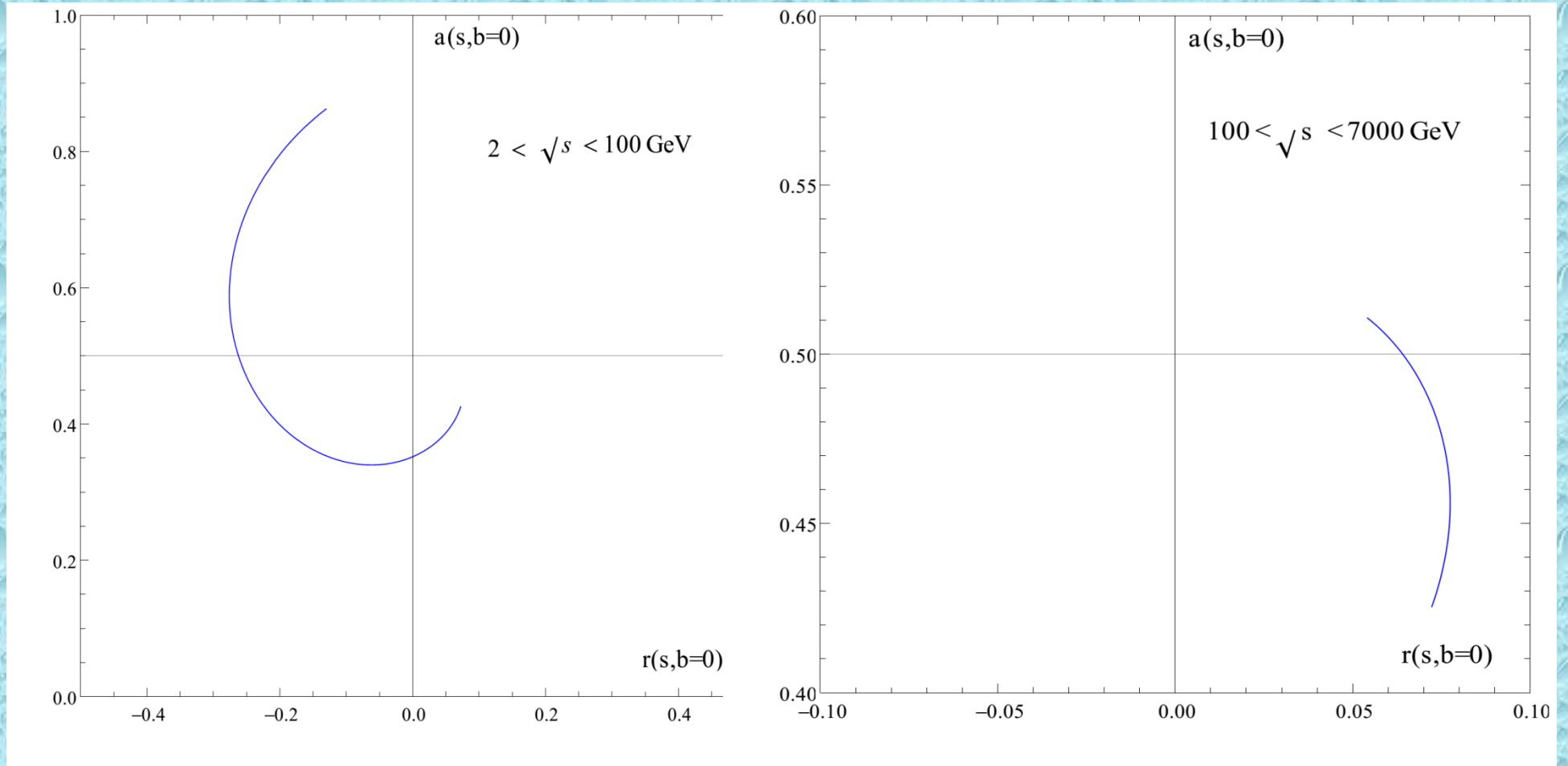
If you're blue
And you don't know
Where to go to
Why don't you go
Where fashion sits...



Let's Do It Ourselves!



Listen, Do You Want to Know a Secret?



It's Too Early To Cry...



Allen Karl

Everybody thinks my head's full of nothin',
Wants to put his special stuff in,
Fill the space with candy wrappers,
Keep out sex and revolution,
But **there's no hole** in my head



Malvina Reynolds

I thank all the people for coming here