

Dark Matter

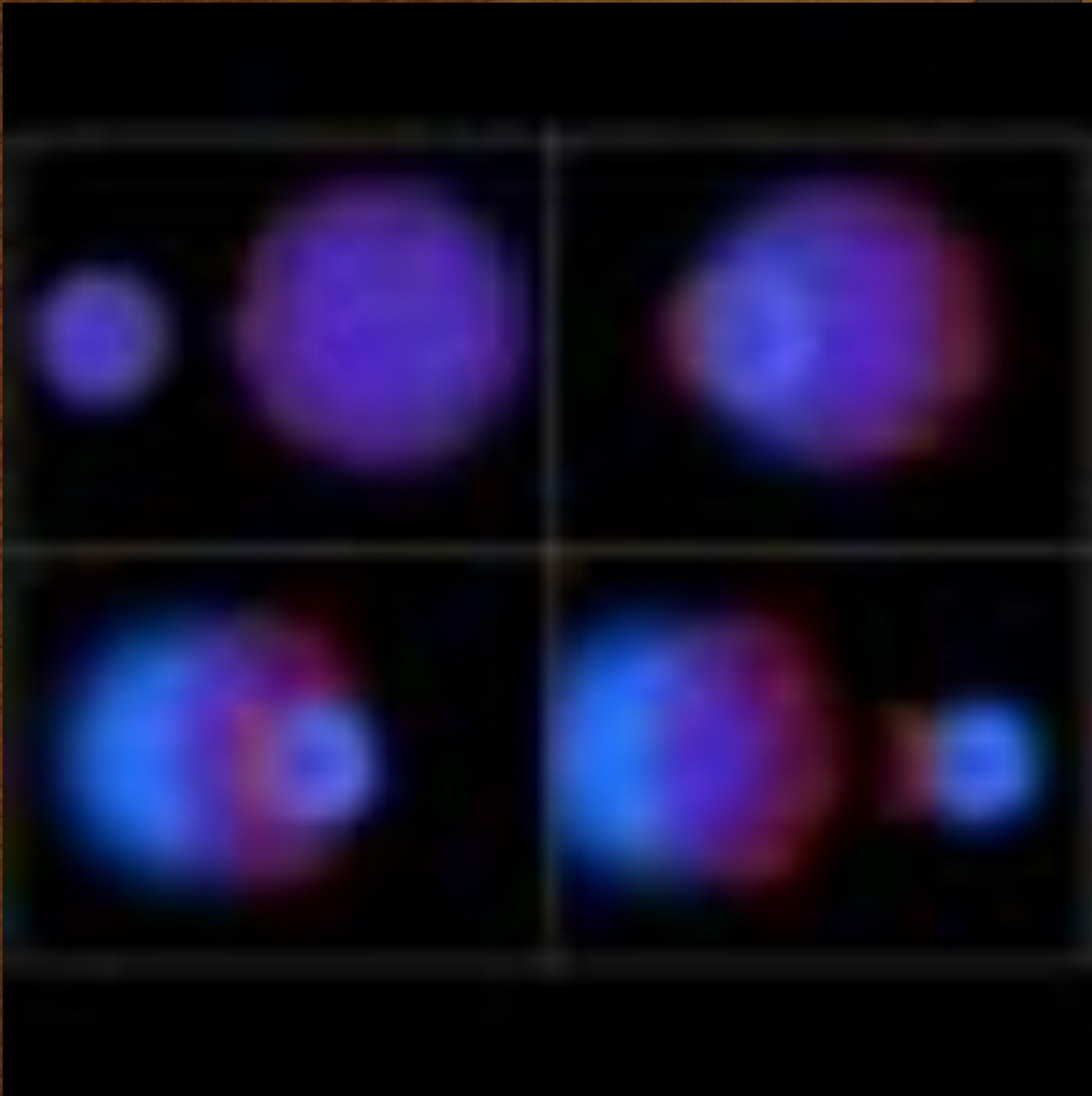
Jimmy

A deep-field astronomical image showing a vast field of galaxies. The background is filled with numerous small, distant galaxies. In the center, there is a prominent, bright, multi-colored glow. This glow consists of a large, diffuse red region and a smaller, more concentrated blue region. The text "Is it Real?" is overlaid in white, serif font in the upper-middle part of the image.

Is it Real?

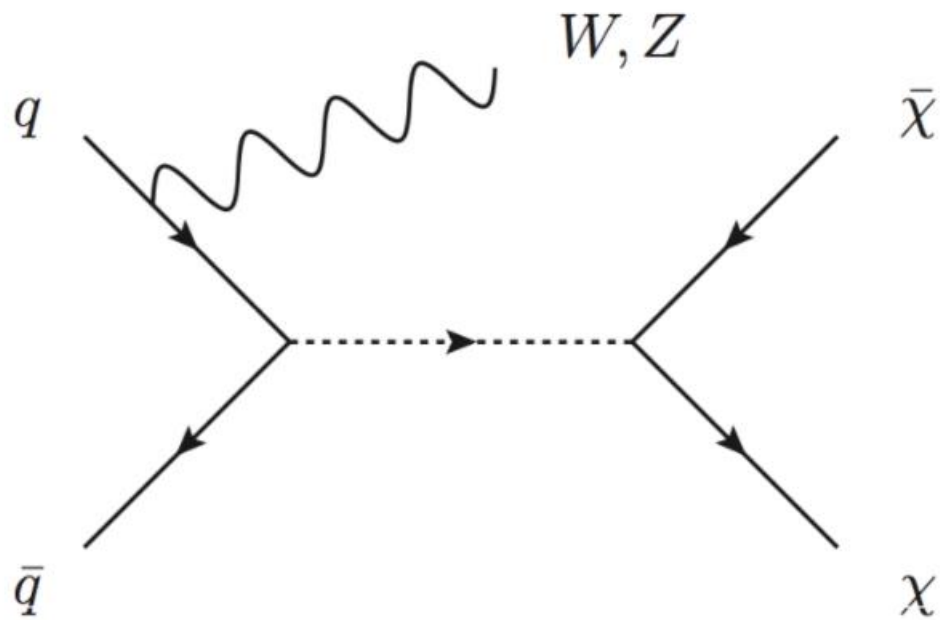
Bullet Cluster

- Chandra x-ray observatory: the collision of two clusters of galaxies.

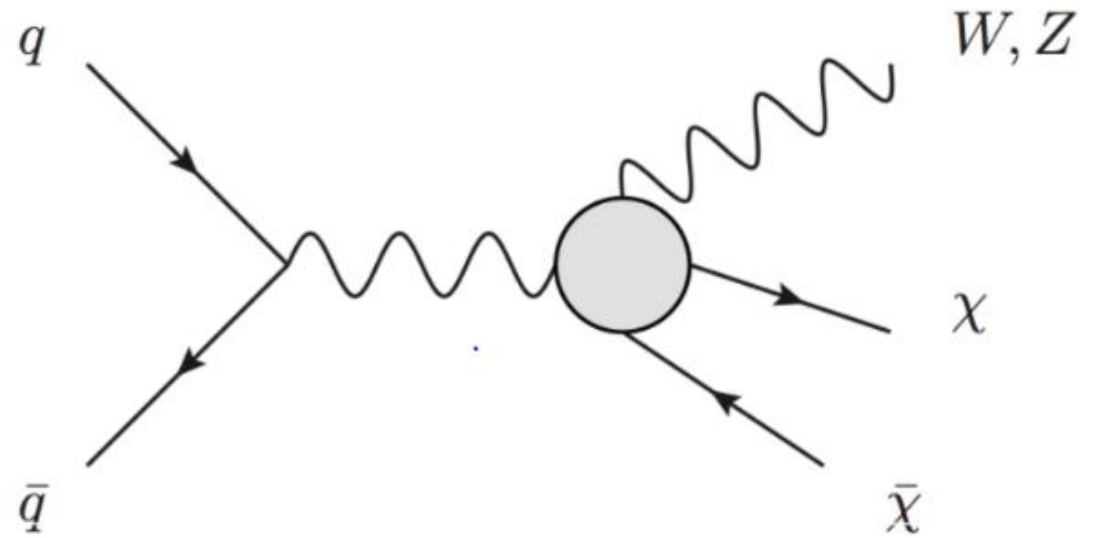


Production at LO

1) W,Z production by ISR

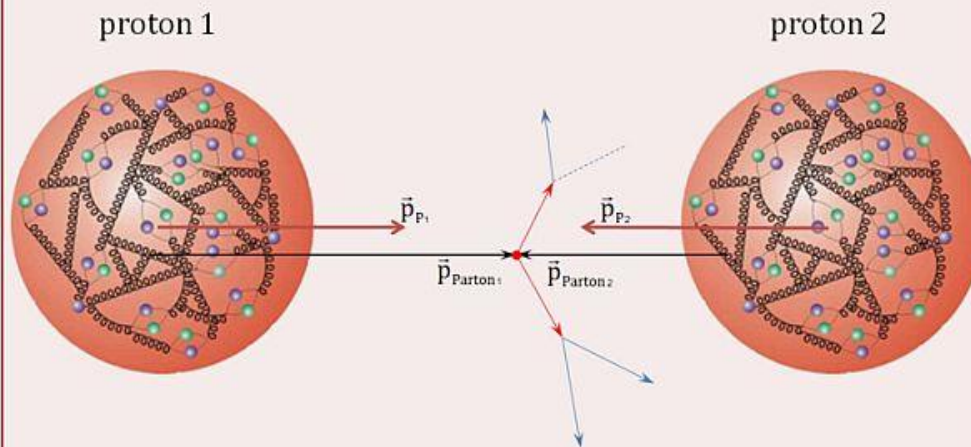


2) W,Z production by unknown process



Scales and Cross-sections

Interactions of constituents of the colliding protons, the so called partons (quarks, gluons)



\vec{p}_{P_1} ... momentum proton 1

\vec{p}_{P_2} ... momentum proton 2

• interaction vertex

\vec{p}_{Parton_1} ... momentum parton 1

\vec{p}_{Parton_2} ... momentum parton 2