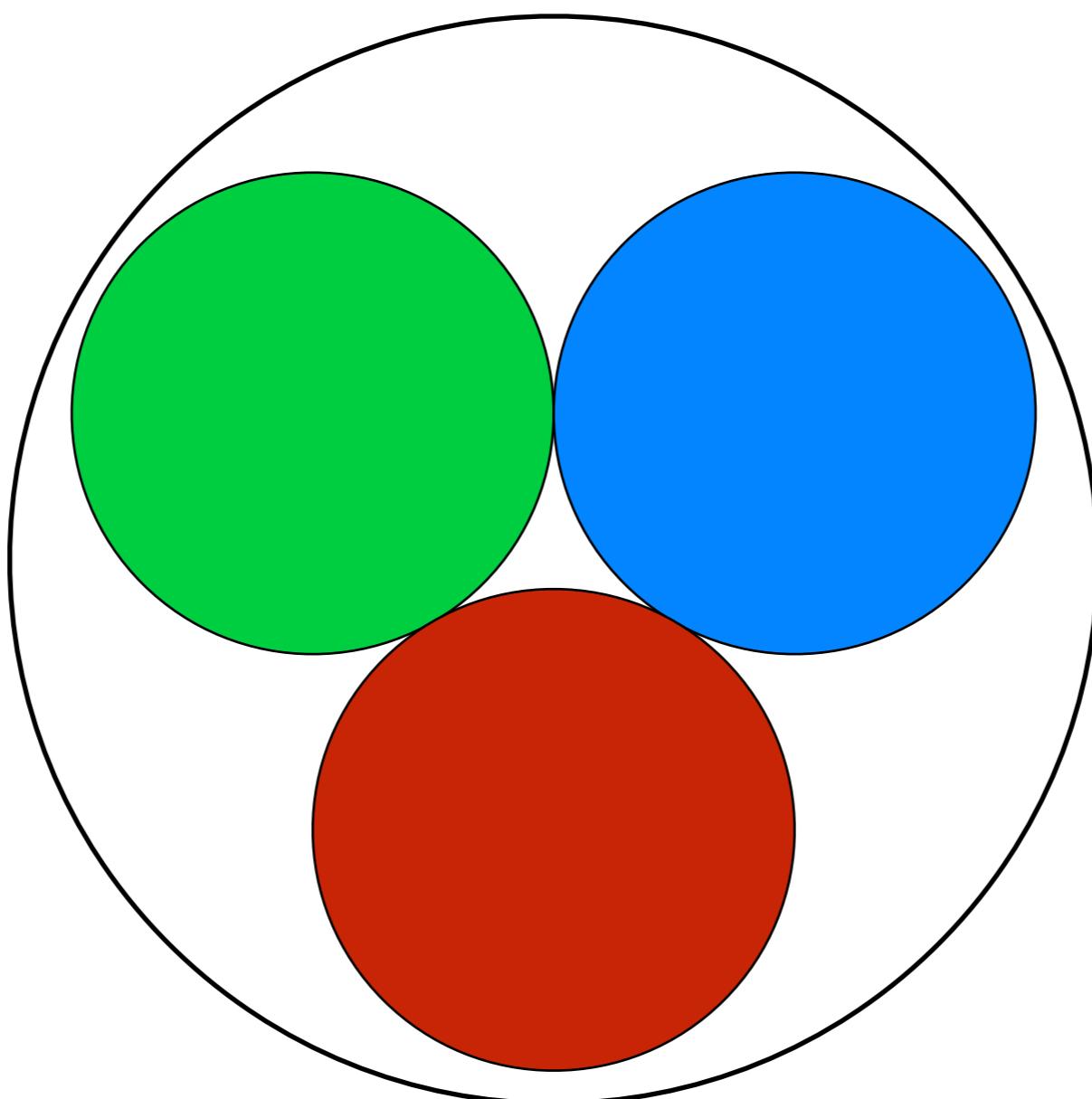
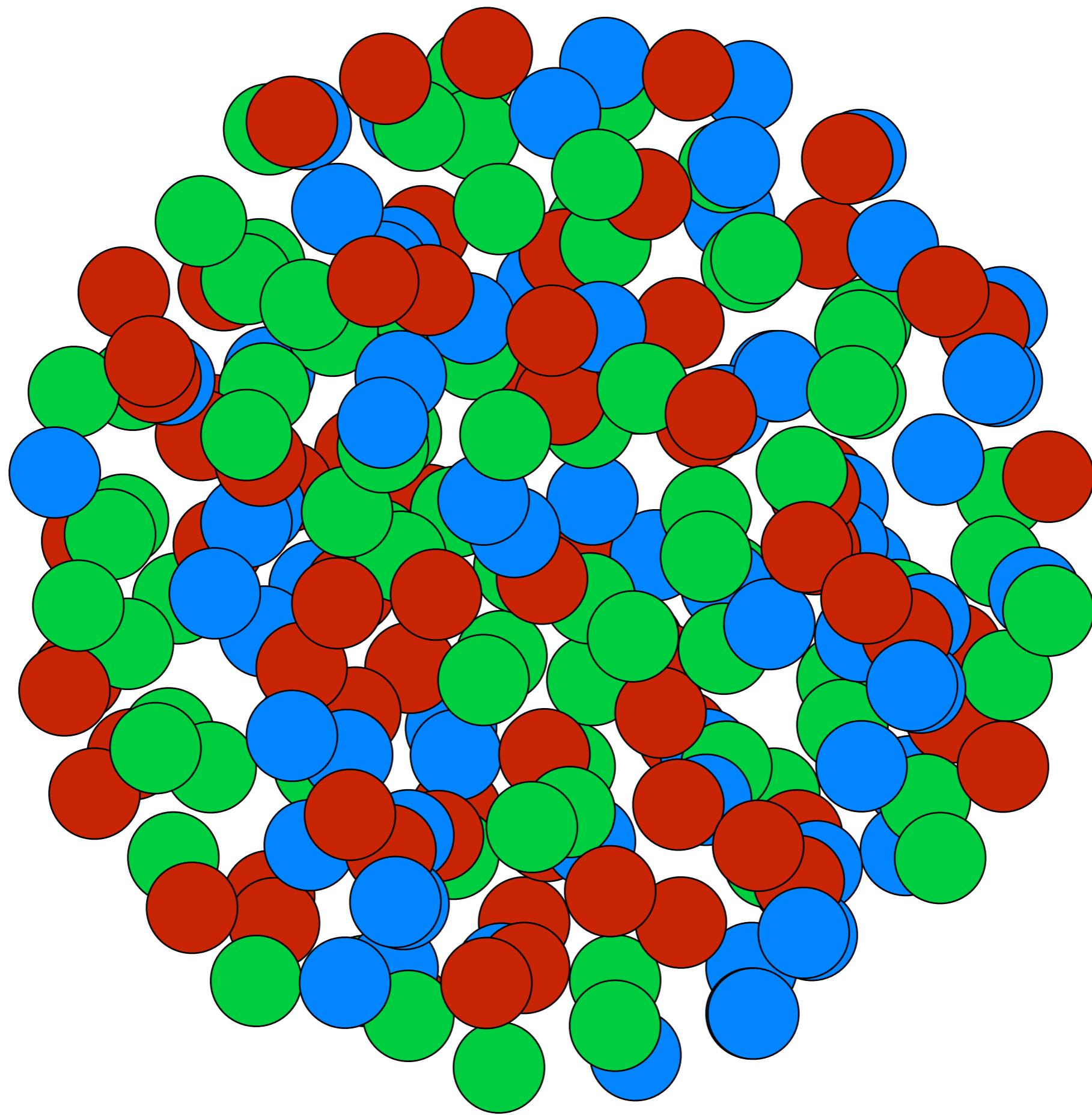
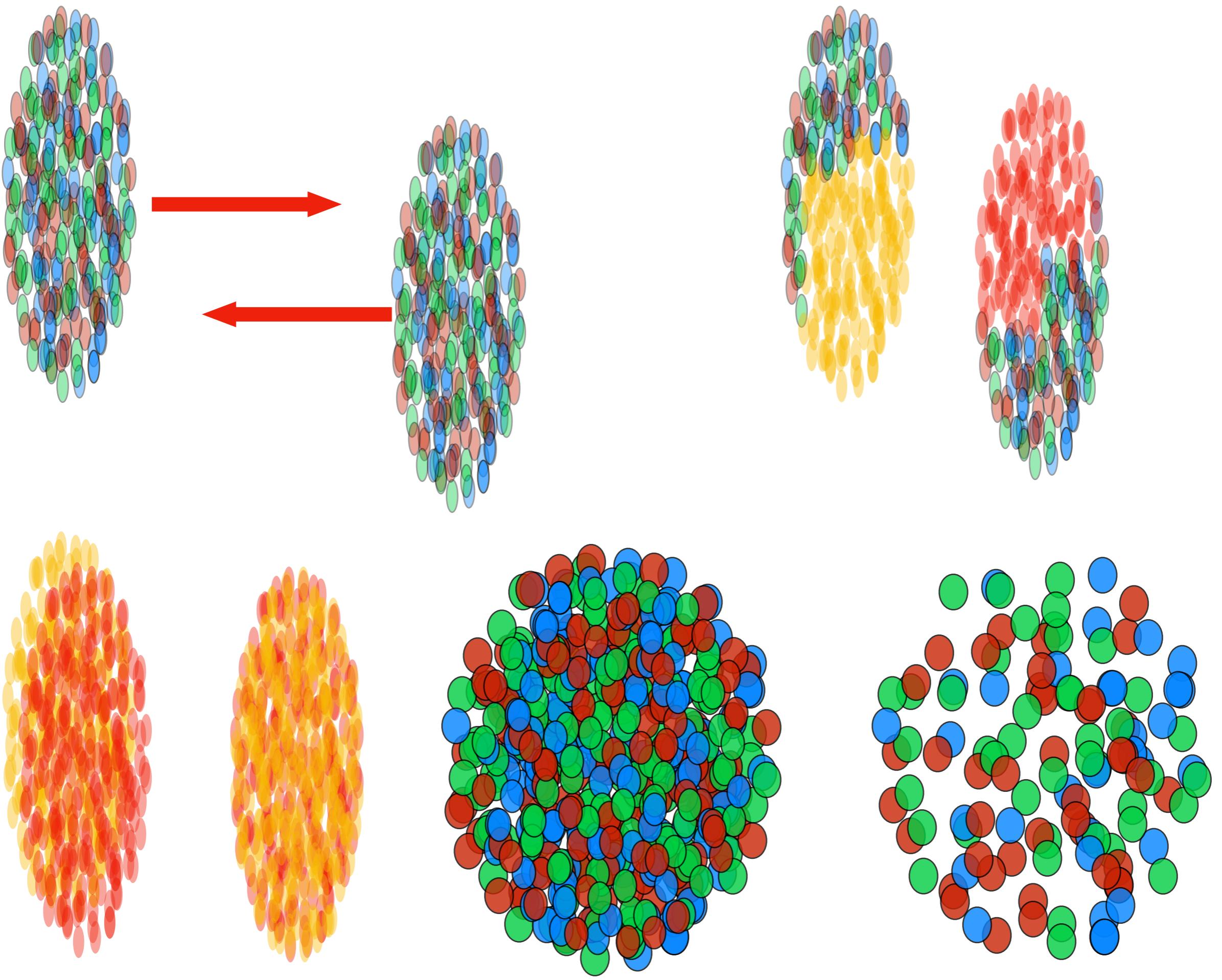
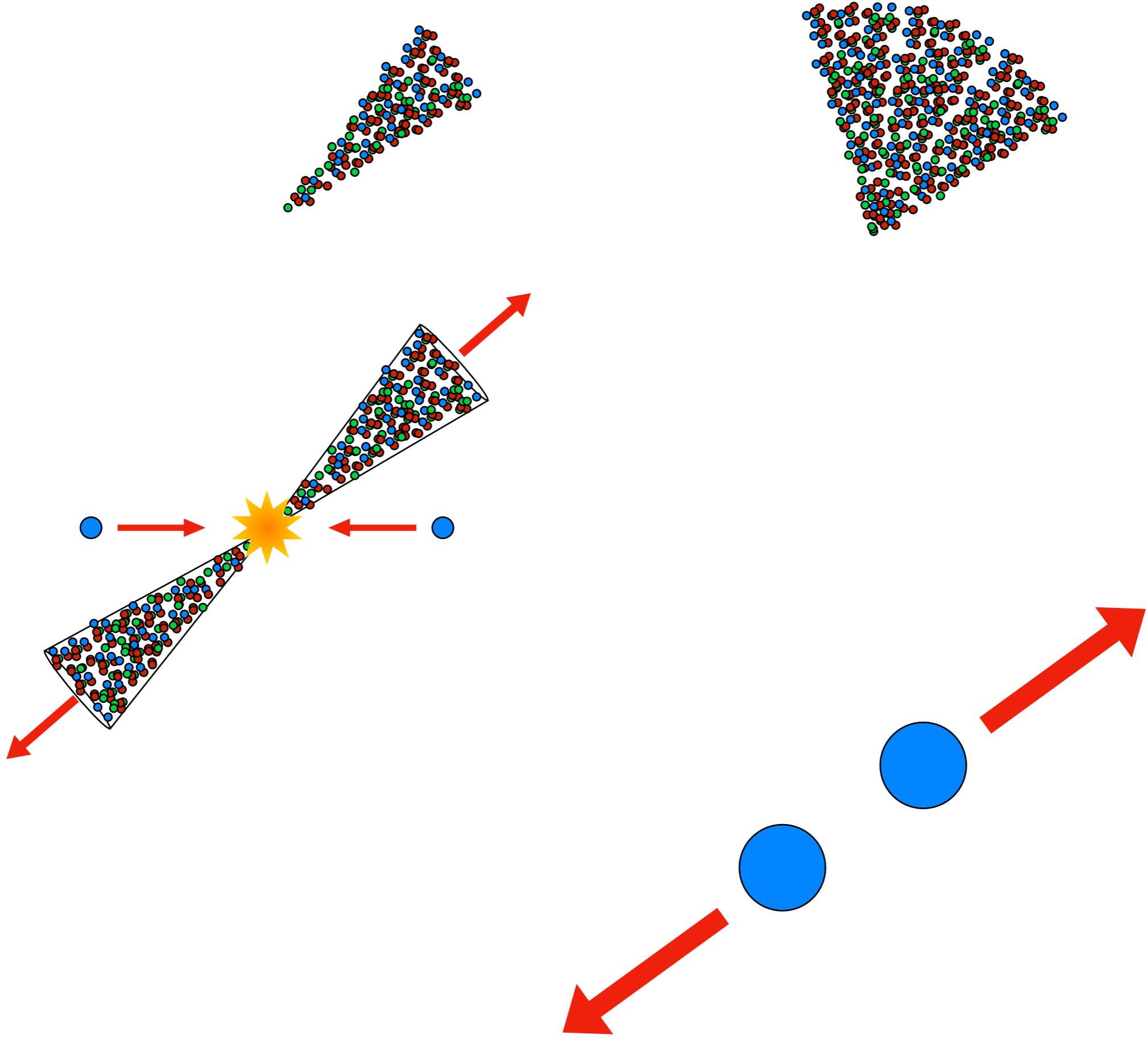


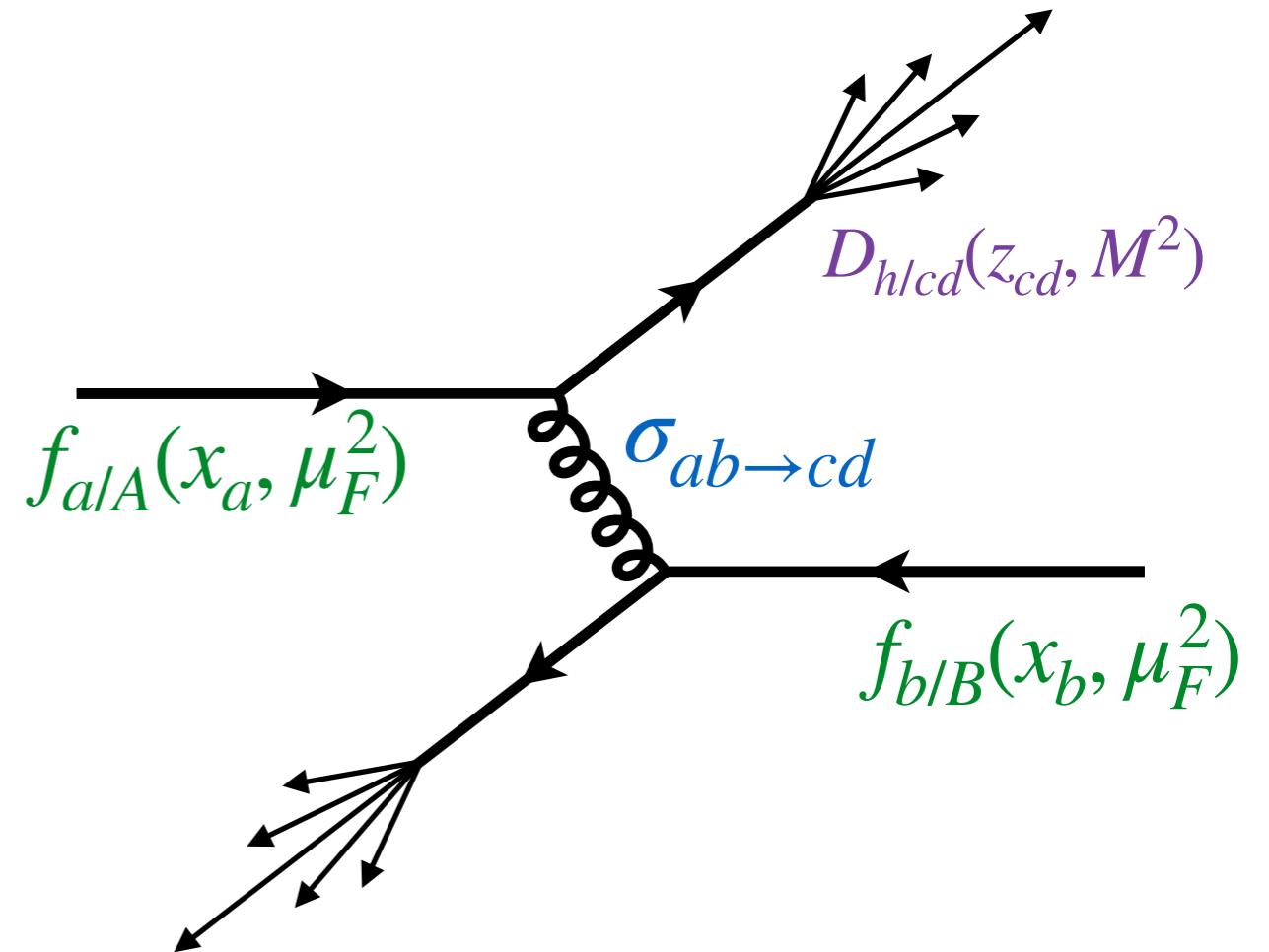
Proton







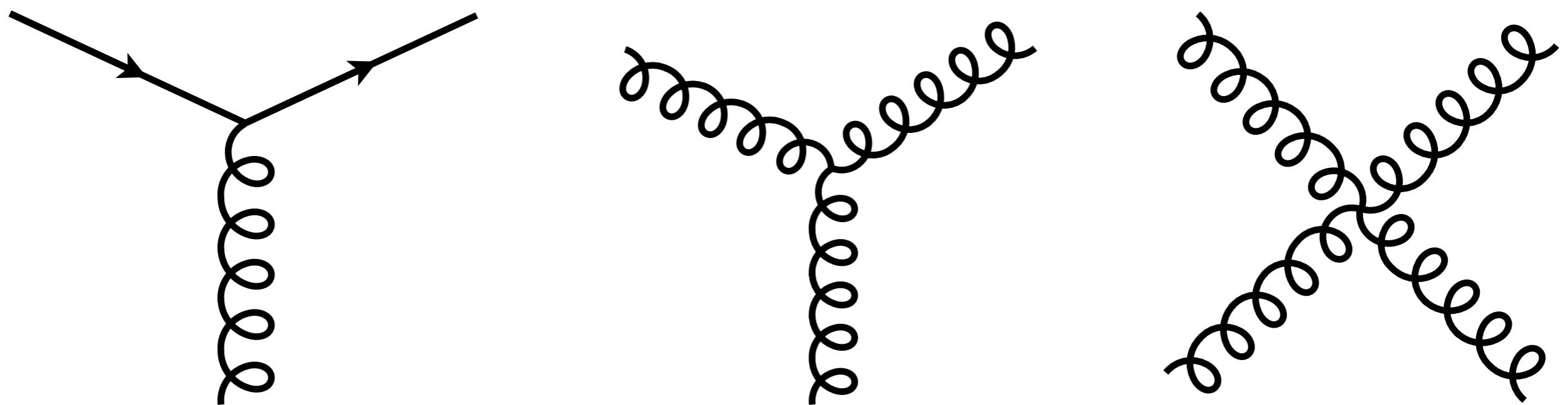


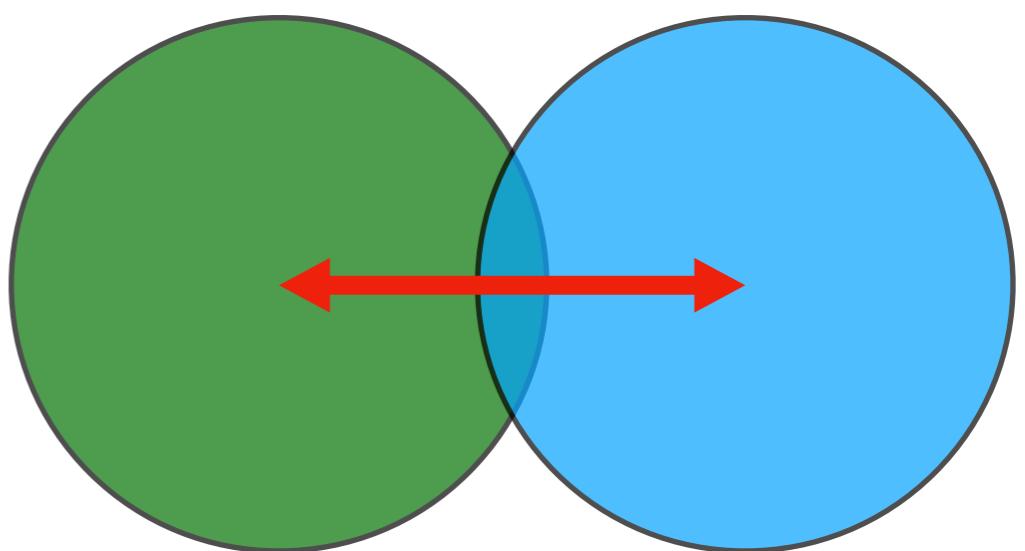
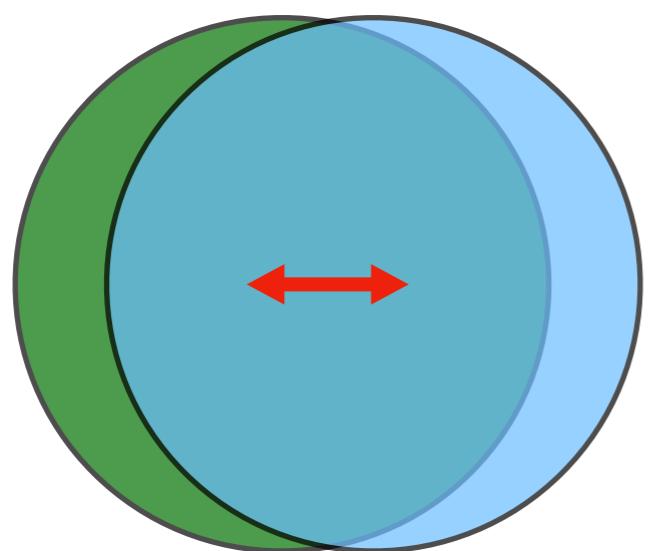


$$d\sigma_{pp \rightarrow hX} \approx \sum_{abjd} \int dx_a \int dx_b \int dz_j f_{a/p}(x_a, \mu_f) \otimes f_{b/p}(x_b, \mu_f)$$

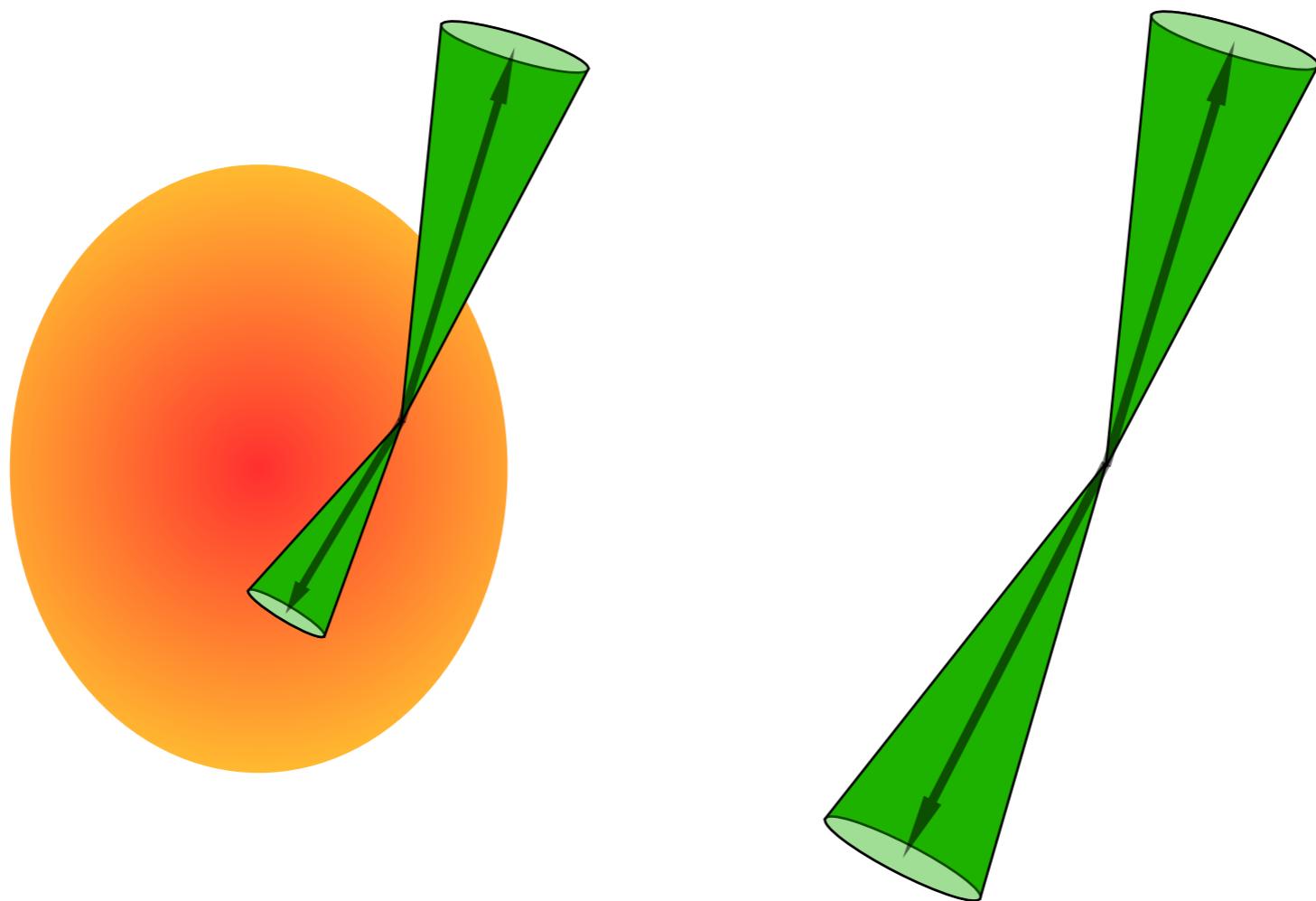
$$\otimes d\sigma_{ab \rightarrow jd}(\mu_f, \mu_F, \mu_R)$$

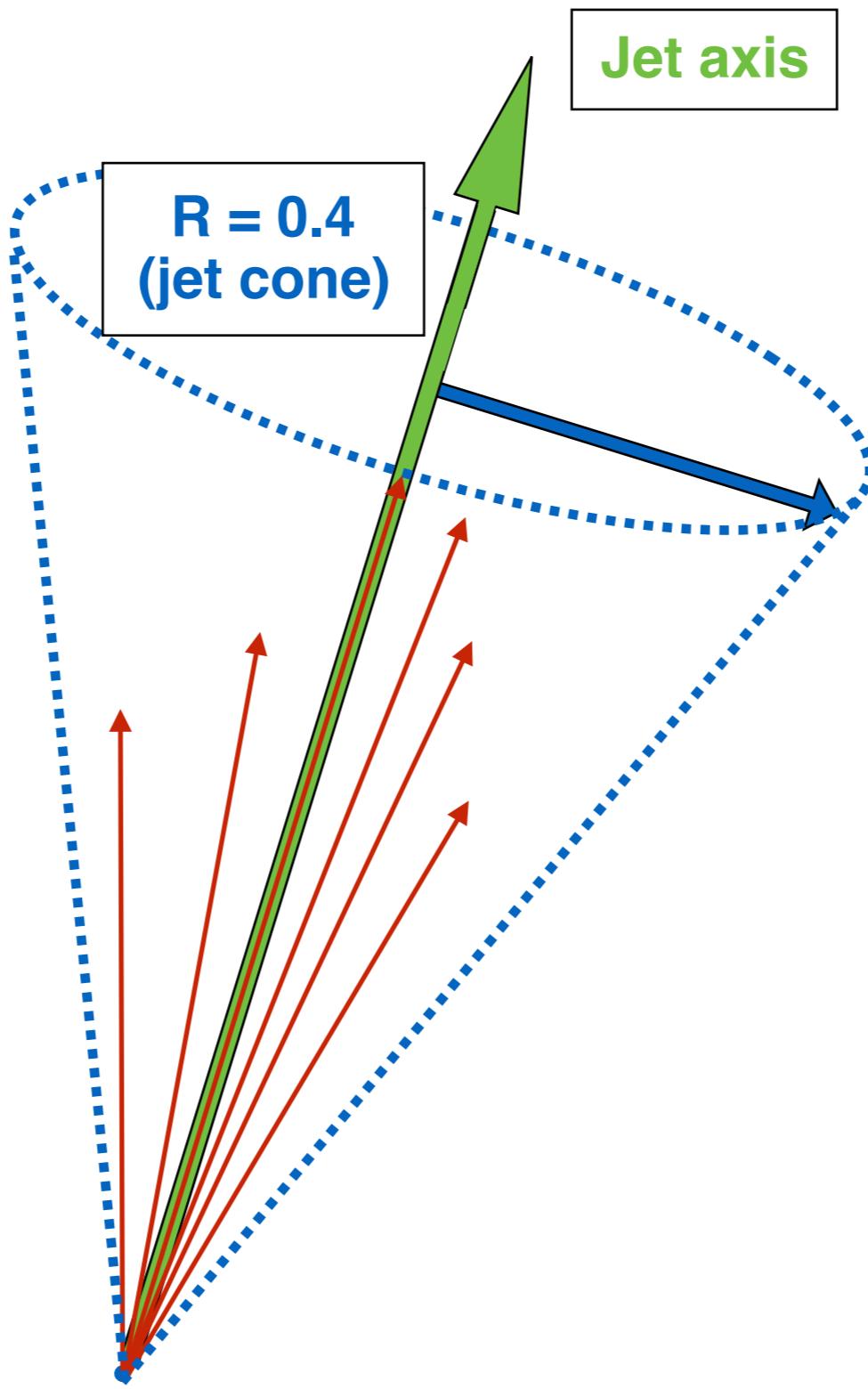
$$\otimes D_{j \rightarrow h}(z_j, \mu_f)$$

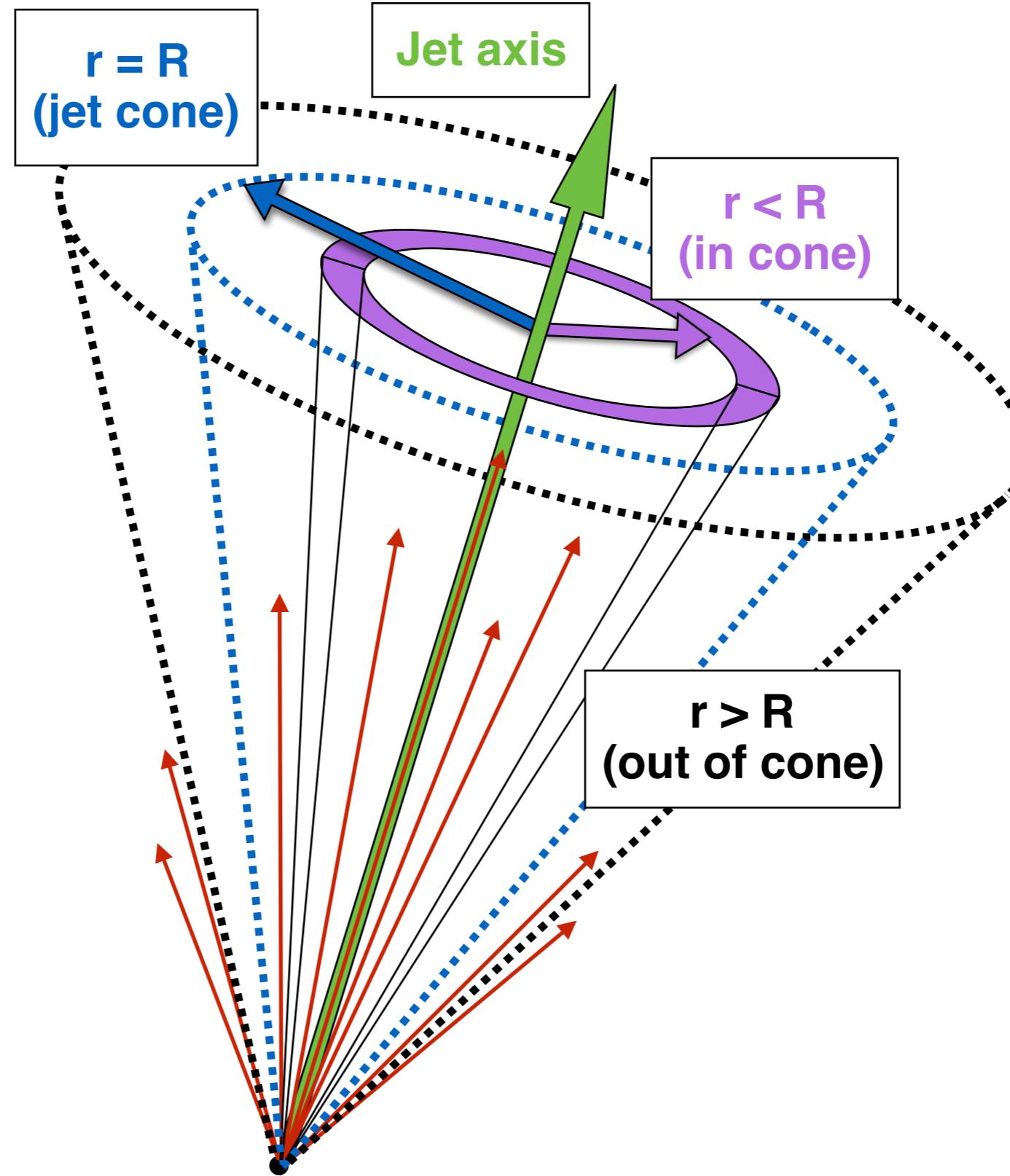




- R_{AA} : Comparing the number of jets in PbPb and pp collisions
- Dijet asymmetry: Comparing the momenta of back to back jets that conserve momentum
- Jet fragmentation: Measuring the energy distribution of particles inside jets

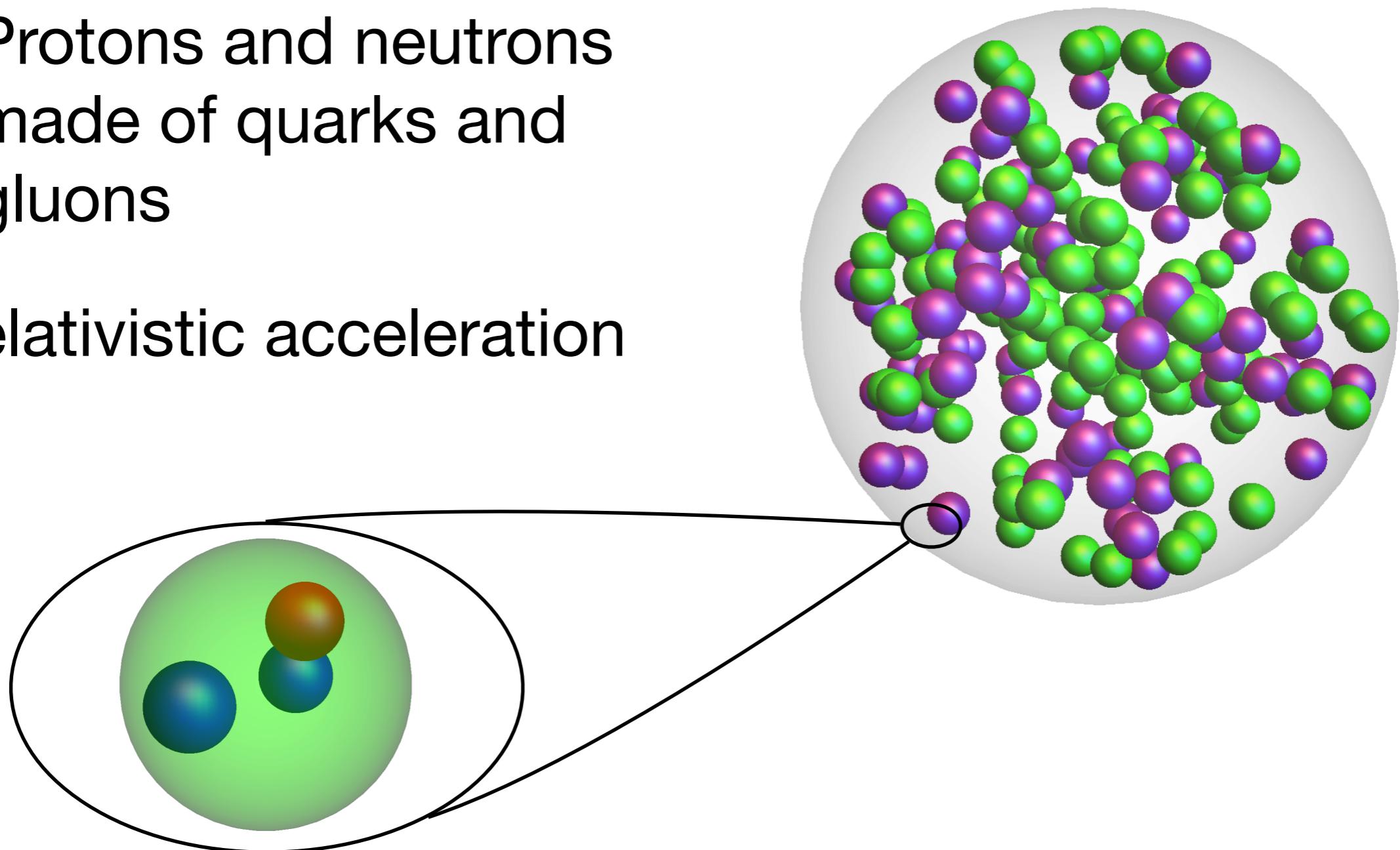






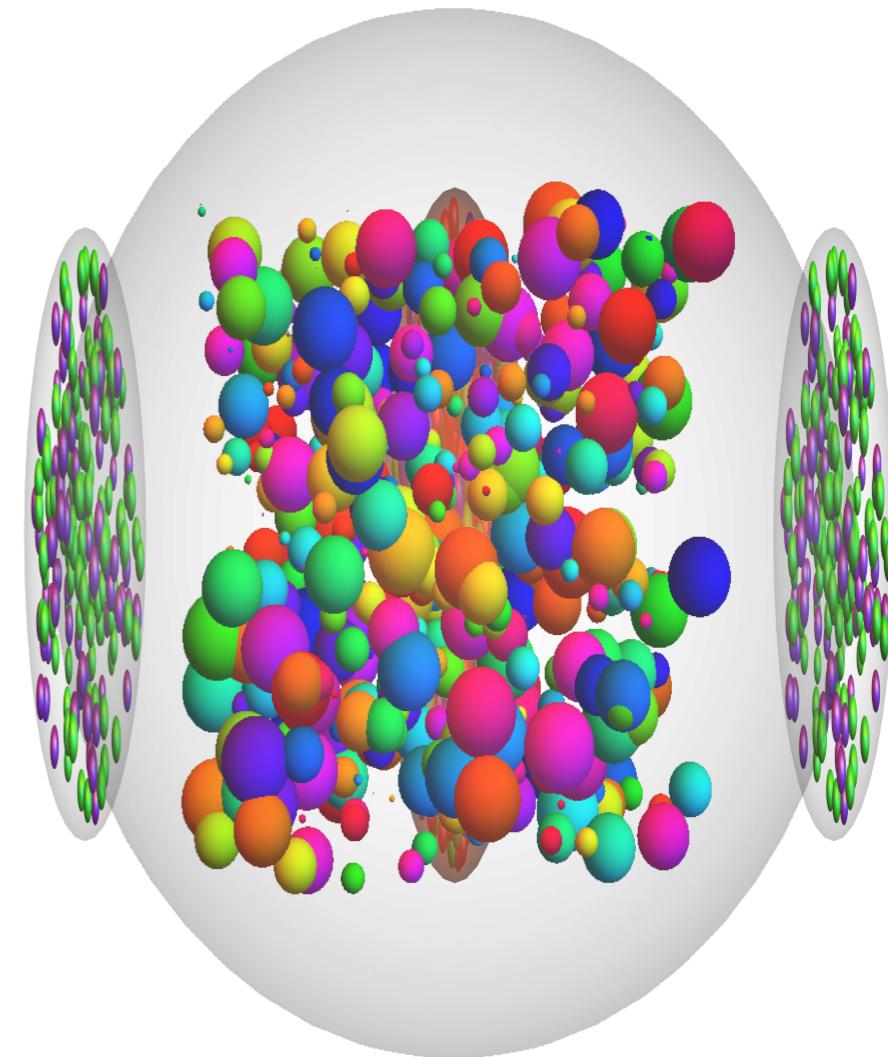
Why Heavy Ions

- Lead nucleus used as heavy ion
- Protons and neutrons made of quarks and gluons
- Relativistic acceleration



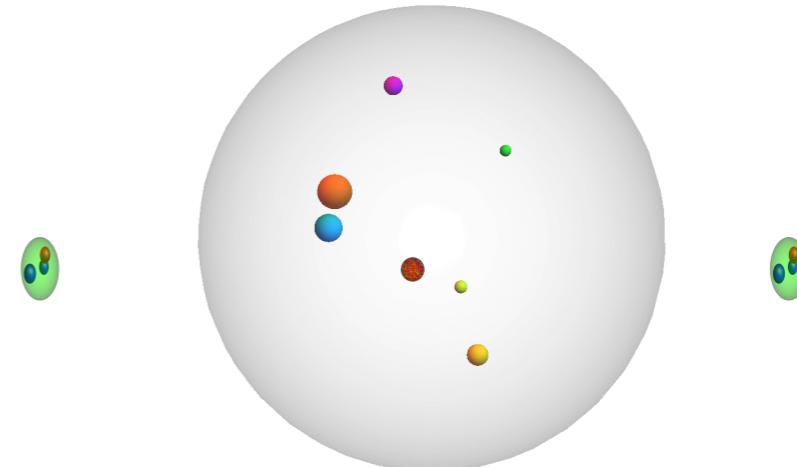
Why Heavy Ions

- Lead nucleus used as heavy ion
- Protons and neutrons made of quarks and gluons
- Relativistic acceleration
- Collisions
 - Quark Gluon Plasma
 - Hadronization



What about proton collisions

- Smaller quark gluon plasma in proton-proton collisions
- Compare heavy ion to proton proton collisions to quantify effect of Quark Gluon Plasma

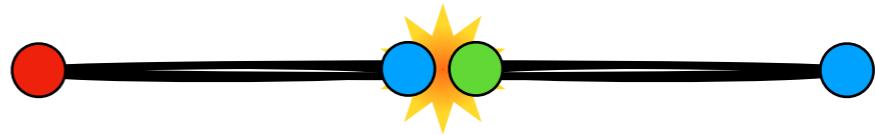


Jets

- Quarks and gluons cannot be directly observed
- Flying apart at relativistic energies

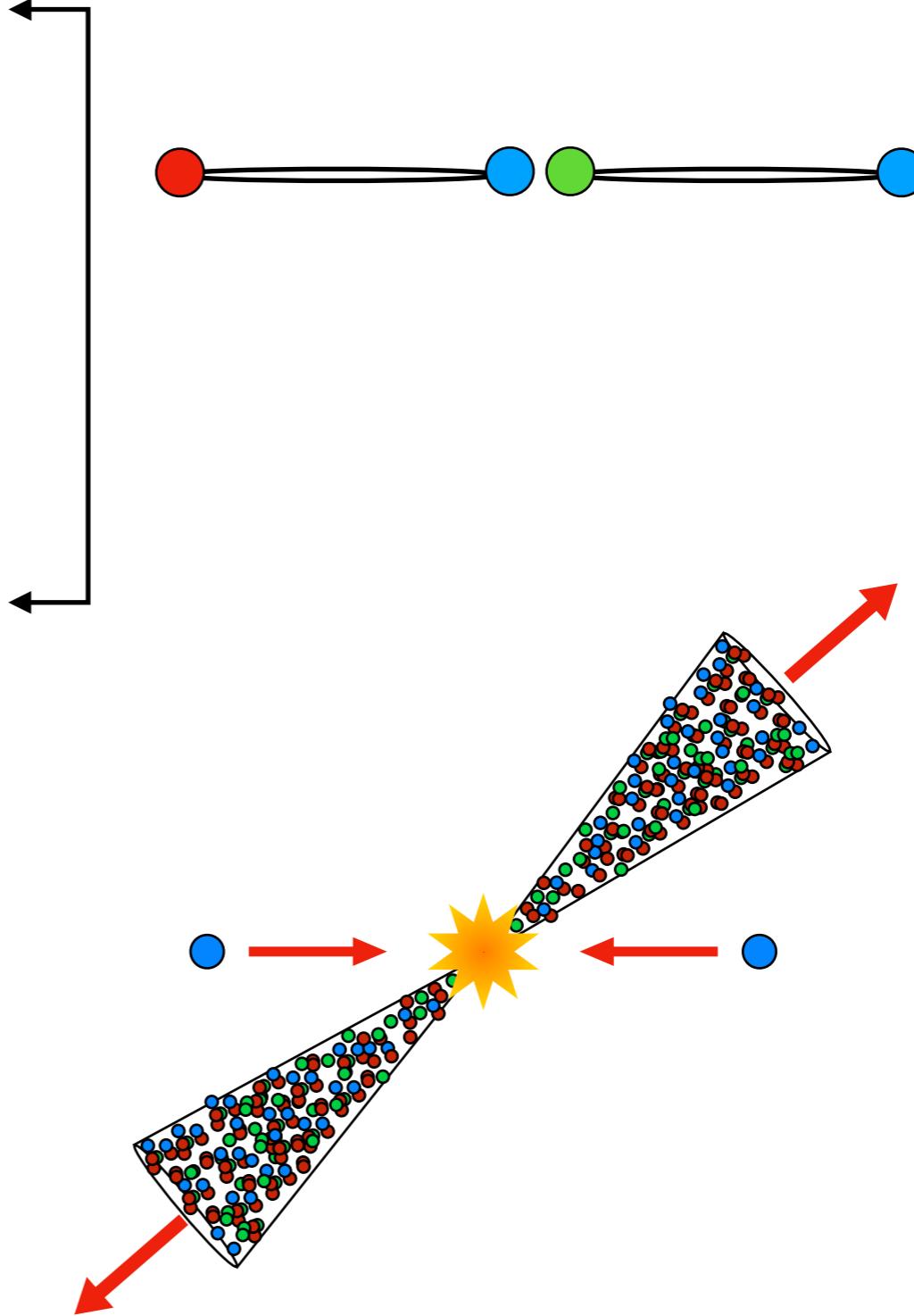


- Quarks and gluons cannot be directly observed
- Flying apart at relativistic energies
- Partons created to form composite particles



Jets

- Quarks and gluons cannot be directly observed
- Flying apart at relativistic energies
- Partons created to form composite particles
- Jets are particle showers from initial hard scattering



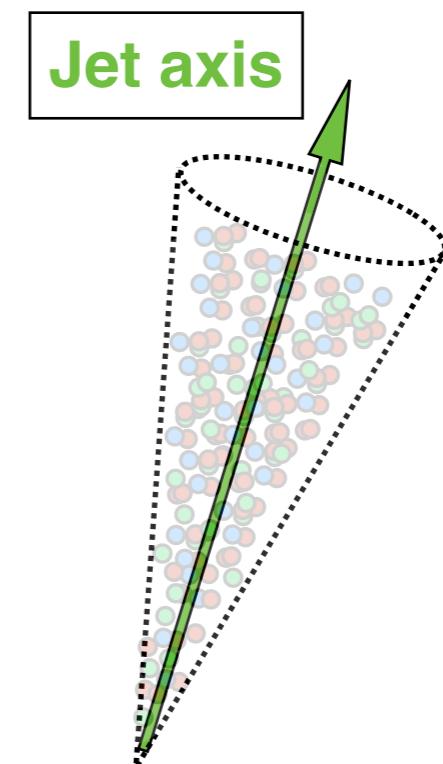
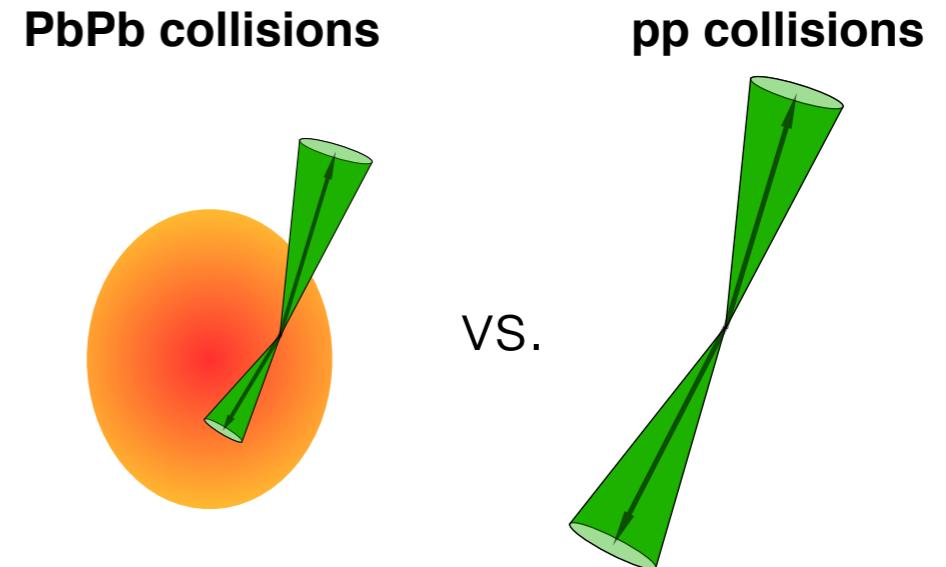
Jet measurements

- **Dijet asymmetry:**

Comparing the momenta
of back to back jets that
conserve momentum

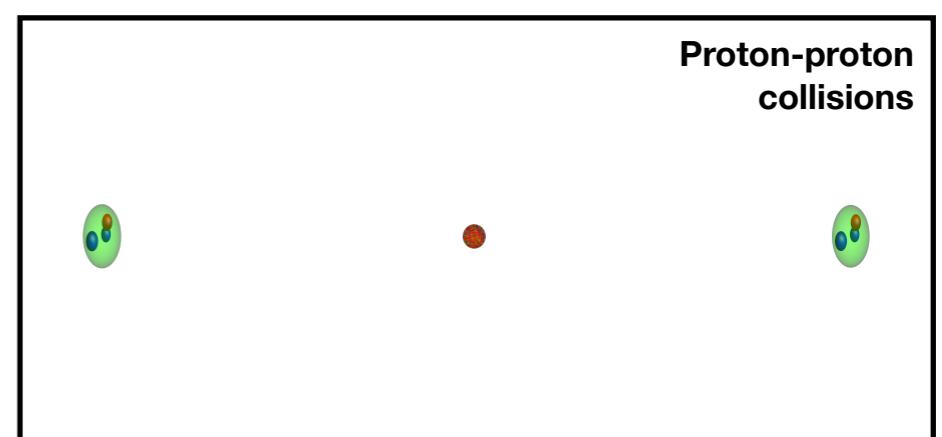
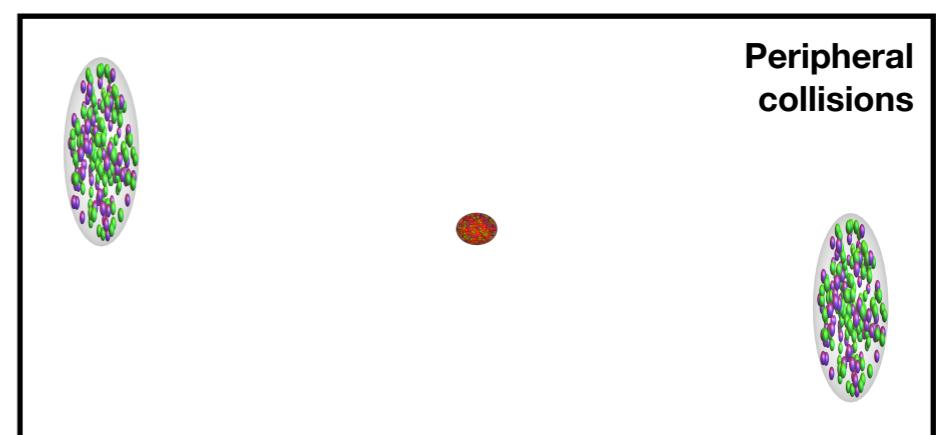
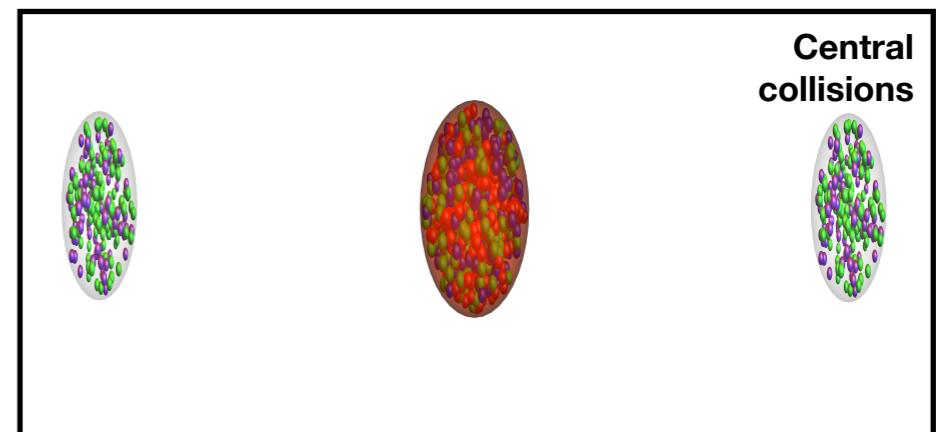
- **Jet yields:** Comparing
the number of jets in
PbPb and pp collisions

- **Jet shapes:** Measuring
how energy distributed
around the jet



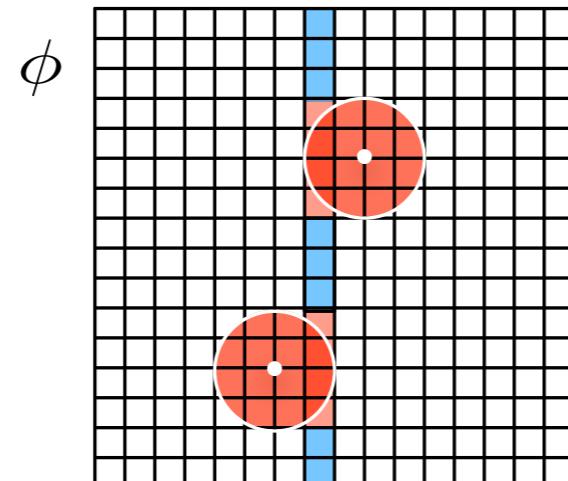
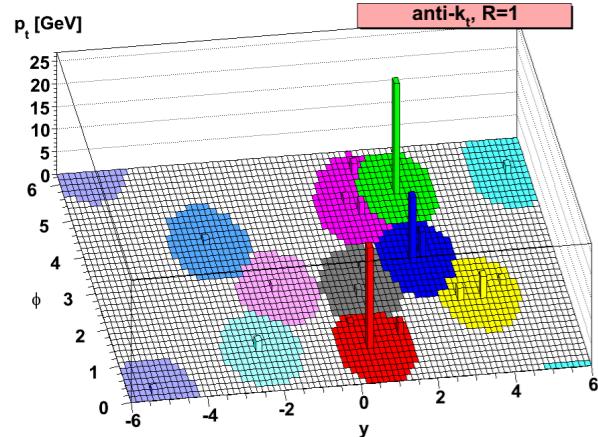
But wait...

- Nuclei are extended objects
- What if they almost miss?
- Similar to proton-proton collision
- Centrality
 - Proxy for impact parameter



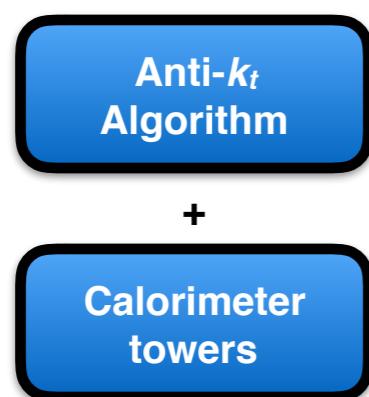
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arxiv - 0802.1189

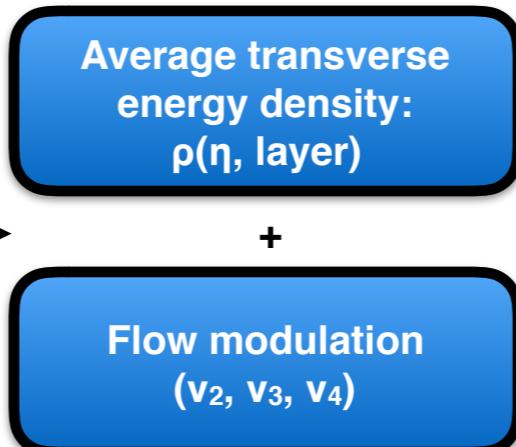


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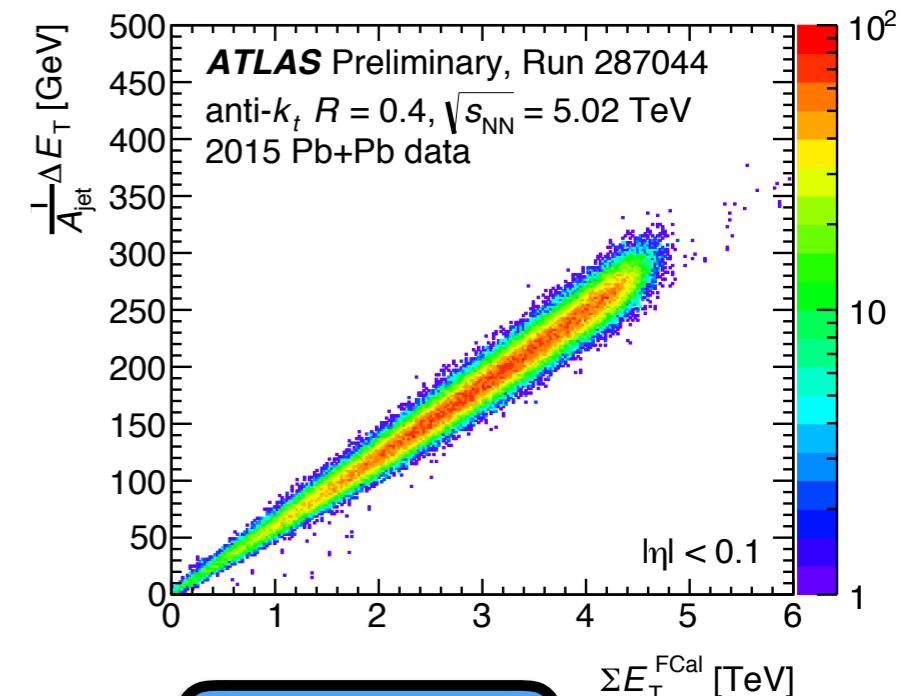
Average transverse
energy density:
 $\rho(\eta, \text{layer})$



Jets

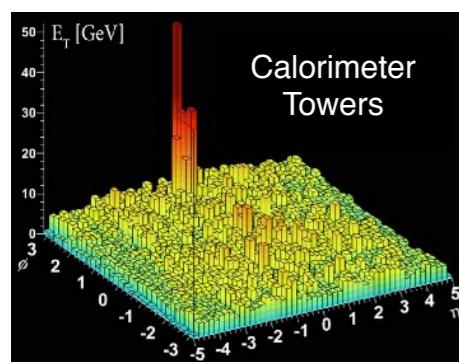


HION-2015-001



**Reconstructed HI
Jets**

Iterative subtraction



AtlasPublicEventDisplays Run1

ATL-COM-PHYS-2012-628

