Quantitative control over the dynamical evolution
(without phase transition dynamics + fluctuations)

>= sqrts$_{NN}$ = 30 GeV: gluon-based initial conditions + classical Yang-Mills/kinetic theory+ rel. dissipative hydro + hadronic transport
or anisotropic viscous hydrodynamics

➔ push initial state description down to around sqrts$_{NN}$ = 6 GeV?

Initial State
- stopping (net-proton rapidity distribution, v_1)
- coherence (γ=15, projectile =sheet)
- energy deposition
- (quantum effects=Fermi motion and HBT)

Hot and dense stage
- hydro (ideal, viscous, aniso+v)
+ EoS (T,μ_B), $\eta/s(T,\mu_B)$, $\zeta/s(T,\mu_B)$
- transport
+ Ko/Li spinodal transport,
or Randrup et al Boltzmann Langevin

Late dilute stage
- hadronic transport

multi-fluid hydrodynamics (from initial to hot and dense)

<= sqrts$_{NN}$ = 3 GeV: hadronic transport including mean-field potentials

How do we know, if hydrodynamics works?
- internal consistency in terms of Knudsen/Reynolds number
- does it capture the physics? (cross-check with transport that matches hydro description?)
- influence of the interfaces/boundary conditions?
- Comparison to experimental data?

What the base model for the dynamical evolution should get:
- particle spectra in transverse momentum and rapidity
- elliptic flow
- low mass dileptons

Homework: What is the equation of state and viscosity of a pion-nucleon system with interactions? What is the corresponding Knudsen/Reynolds number? (arXiv: 1308.1923 suggests that hydro will work)