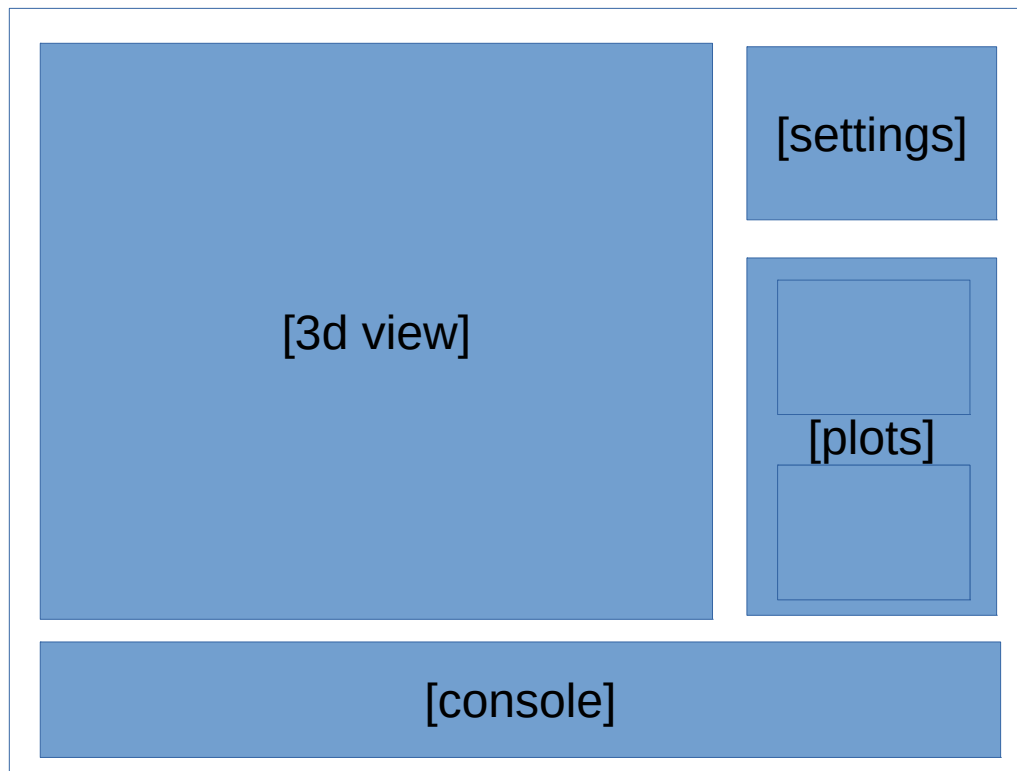


## unity3d-based coulomb-interacting particles application template

the goal is to create unity3d-based gui with console, graphical window and real-time plots, sketch follows.



how it goes (from start)

N moving Coulomb particles of charge -1 (total charge -N) will be initialized randomly in a box of size 10x10x10 units (view sees just this box size and its wireframe sketch), they move according to the Coulomb interaction, see <https://www.youtube.com/watch?v=eBVim8kEhK8>

it is possible to restrict the particles to move within a box (settings option), if off, particles may leak the box but the view stays focused

single charge centre is initially in the box centre (initial charge +N, settings: charge, position x,y,z)

the plot1 in plots panel shows the fluctuating position of the centre of mass of moving particles within last K timesteps (K adjustable in settings)

second plot in plots panel shows dynamically the histogram of the interparticle distances (do data acquisition each Q steps, say Q=10, not every step)

settings

- restart button (restarts)
- number of particles N (integer)
- restrict movement to a box (boolean)
- single adjustable charge centre - charge (float, 1 decimal place) and 3d position vector (floats, 2 decimal places)
- view: observer (as described & default) or particle where camera resets to the position of that particle and looks toward origin
- mode of (user) interaction (with application): observer, particle (interactive mode)

interactive mode: 1st particle stops moving, the user adjusts particle position with keyboard (up arrow - move forward, down-arrow - move backward, mouse adjusts direction in 3d; the remaining

particles keep moving and feel also this particle as before; if user picks observer mode in settings, the view resets to see all particles as before

functionality:

if user picks a particle in observer mode by mouse, it somehow highlights, can be deleted by "delete" button

console:

- if user enters "e" or "-e", the number of particles changes,  $N=N+1$  or  $N=N-1$  (particle randomly generated in box, or the last one in the list deleted)
  - "restart" restarts app
  - "reset hist" resets statistics accumulation to the histogram plot in plots panel
- [more options to be added upon discussion]