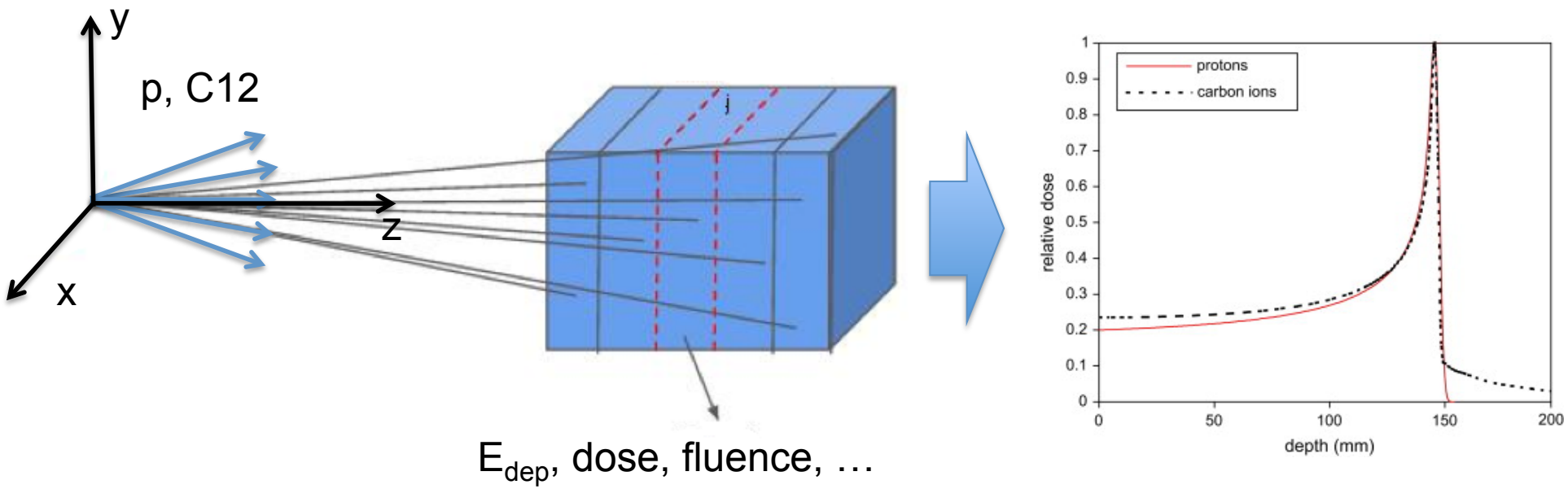
Common example Geant4/Fluka

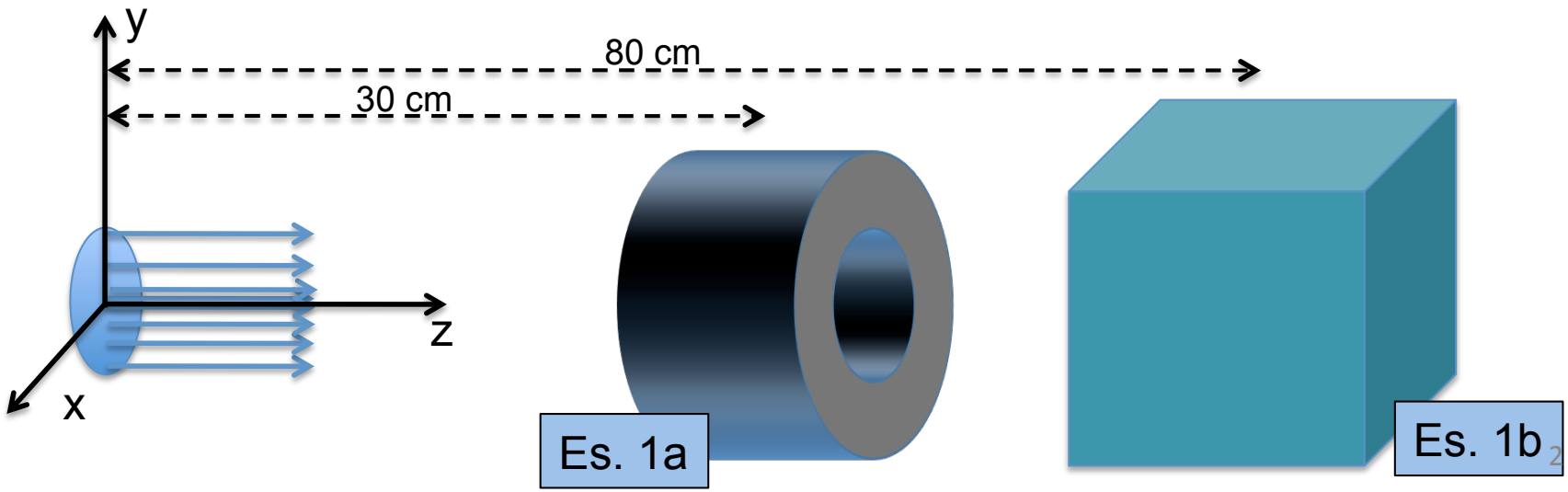


E_{dep}, dose, fluence, …

- **Ex. 1: implementation of geometrical volumes**
- **Ex. 2: generation of primary particles**
- **Ex. 3: implementation of a virtual division**
- **Ex. 4: change some physical parameters**

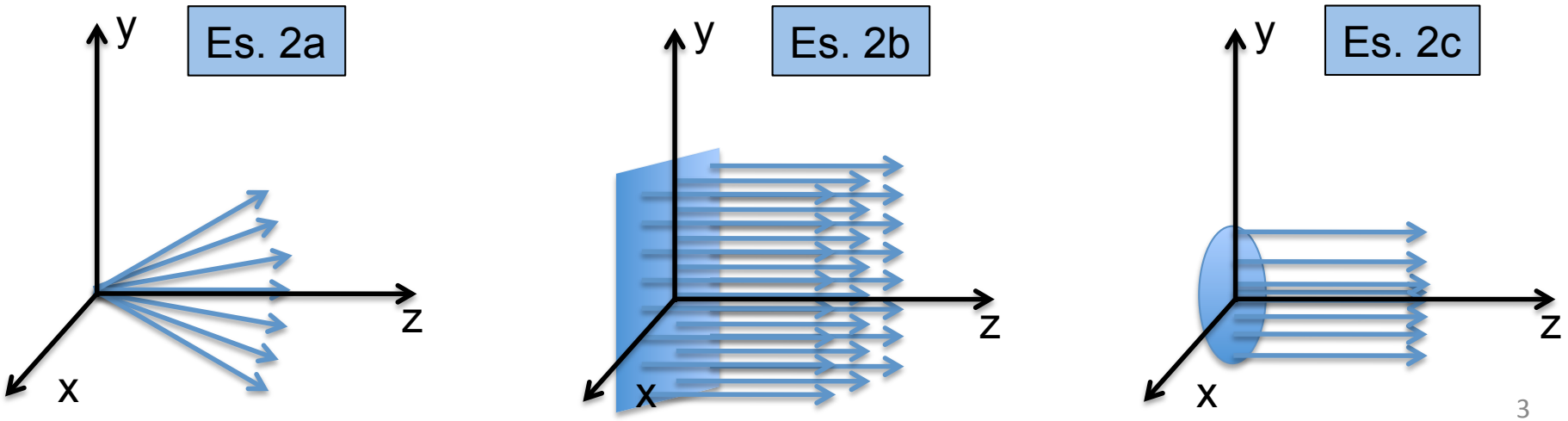
Common example Geant4/Fluka

- **Ex. 1: implementation of geometrical volumes**
  - Ex. 1a: implementation of a **hollow cylinder** of Pb centred at A(0, 0, 30 cm)
    Rmin = 1 cm
    Rmax = 10 cm
    l = 20 cm
  - Ex. 1b: creation of a **water cube** centred at B(0, 0, 80 cm)
    l = 40 cm



Common example Geant4/Fluka

- **Ex. 2: generation of primary particles along Z axis**
  - Ex. 2a: generation of a **proton** beam **@100 MeV** → **point-like** (default)
  - Ex. 2b: like before (p @ 100 MeV) → **rectangular source** of side l_1=2cm e l_2=4cm centred on the origin (particle direction II z)
    -1 < x < 1 -2 < y < 2
  - Ex. 2c: like before (p @ 100 MeV) → **gaussian source** of $\sigma_X = \sigma_Y$ = 2 cm add an **energetic spread** of 0.5% (σ_E)
    (keep that in the followings exercises)



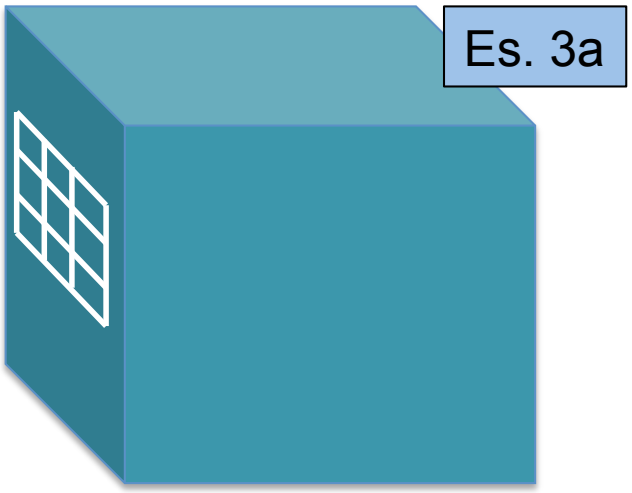
Common example Geant4/Fluka

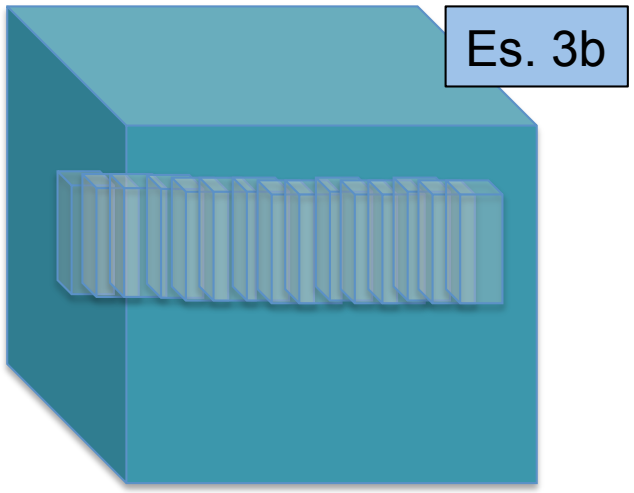
- **Ex. 3: implementation of a virtual division:**

  Add G4ScoringManager in the main and execute: /control/execute solution_scorer.mac

  - Ex. 3a: implementation of a **voxelized** division adjacent to the left side of the cube, and production of an ascii file with **energy deposited** per voxel
    - dimension of the virtual geometry: $l_x = l_y = l_z = 5$ cm
    - single voxel dimension: $d_x = d_y = d_z = 5$ mm

  - Ex. 3b: implementation of a **sliced** division adjacent to the left side of the cube, and production of an ascii file with **energy deposited** per slice
    - dimension of the virtual geometry: $l_x = l_y = 5$ cm; $l_z = 40$ cm
    - single slice dimension dimension: $d_x = d_y = 5$ cm; $d_z = 0.1$ mm





Common example Geant4/Fluka

- **Es. 4: plots and Geant4/Fluka comparisons**
  - Es. 4a: execute the simulations in the same conditions (as before) and changing the followings parameters:
    - **protons @ 100, 250 MeV**
    - **C12 @ 100, 400 AMeV**
  - Es. 4b: in case of remaining time, calculate:
    - **Total dose deposited**