



Supplementary information S1 (figure) | **GroEL-ATP states.** The four types of GroEL conformation seen in the presence of ATP are shown as cryo EM maps with fitted atomic coordinates. The apo form (PDB 1oel) has no ATP bound, Rs_1 (EMDB EMD-1997; PDB 4aaq) and Rs -open (EMDB EMD-1999; PDB 4aas) rings are fully occupied with ATP. The R-ES conformation (PDB 1svt) is the ATP and GroES-bound state, but GroES is not shown. Helices H and I, defining the position of the substrate binding sites, are shown in red and orange respectively, and their orientations are represented by the cartoon cylinders.