Time structures for a mercury target test beam

Summary of discussions with
M. Giovannozzi, S. Hancock and E. Metral

- Approach without batch compression :
  - Four PS Booster rings run with h_{PSB}=1 and deliver beam to the PS running with h_{PS}=8 :
    - Every second bucket is filled for a “long” bunch train or,
    - Into adjacent h=8 buckets for “short” bunch trains.
  - After acceleration to 20 GeV/c (or 24 GeV/c ?) and extraction one obtains :
    - 4 bunches (with length ~50ns) spaced by 525 ns or
    - 4 bunches (with length ~50ns) spaced by 262 ns
  - Setting-up :
    - synergies with studies (double batch injection) in view of CNGS.
    - at least 2.0×10^{13} protons per pulse look feasible with reasonable additional effort (beam time and manpower).

- AD like batch compression for shorter bunch trains :
  - Procedure :
    - Injection of 4 bunches into adjacent h=8 buckets,
    - Acceleration to 20 GeV/c (or 24 GeV/c ?),
    - Batch compression by changing harmonic number : h=8 → h=10 → h=12 → h=14 → h=16 → h=18 → h=20,
    - No bunch compression (as done for AD),
    - Would yield 4 bunches with a length ~50 ns with a minimal spacing of ~105 ns
    - Maximal intensity : 1.5 10^{13} protons per pulse (longitudinal acceptance at bunch compression limits)
  - Setting-up:
    - Since AD works at 26 GeV/c, batch compression to be set-up,
    - ➢ might require significant effort and beam time for setting-up.