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FRANCE 2030
PROGRAMME DE RECHERCHE
NUMÉRIQUE POUR L'EXASCALE

ExaDoST - Work Package 4
GYSELA Demonstrator

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TODO list for GYSELA (link with WP1 & WP2)

- **Development of a mini-application via Gyselalib++ for I/O + in-Situ diagnostics**
  - initialisation of a 5D distribution function on GPU
    - f(r=*,theta=*,phi=block,vpar=block,mu=block)
    - computation of the fluid moments
      - Fmom(r,theta,phi) = \int f(r,theta,phi,vpar,mu) vpar^alpha mu^beta dvpar dmu
  - MPI transposition
    - f(r=block,theta=block,phi=*,vpar=*,mu=*)
  - copy from GPU to CPU
  - expose via PDI of the CPU 5D distribution function
  - write restart files in NETCDF

- For all I/O tests discussed with WP1:
    - Scalability tests for restart files writing (with and without HDF5 standard compression)

  → **WP2 priority 1 : HDF5 compression option available in PDI both for HDF5 and NetCDF plugins**

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- For in-situ & in-transit diagnostics:
  - **WP2 priority 2: Adding of Kokkos view in PDI**

TODO list for GYSELA (link with WP3)

- Give access to GYSELA Fortran simulation results [DONE today via Adastra]
  - Need of long time turbulent simulation for PCA tests (linear + non-linear phase)

- Python diagnostics :
  - to reconstruct the distribution function depending on the MPI domain decomposition with associated documentation
  - For first standard visualisations

- WP3 : Work on compression
  - First steps: PCA for distribution function and electrostatic potential

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