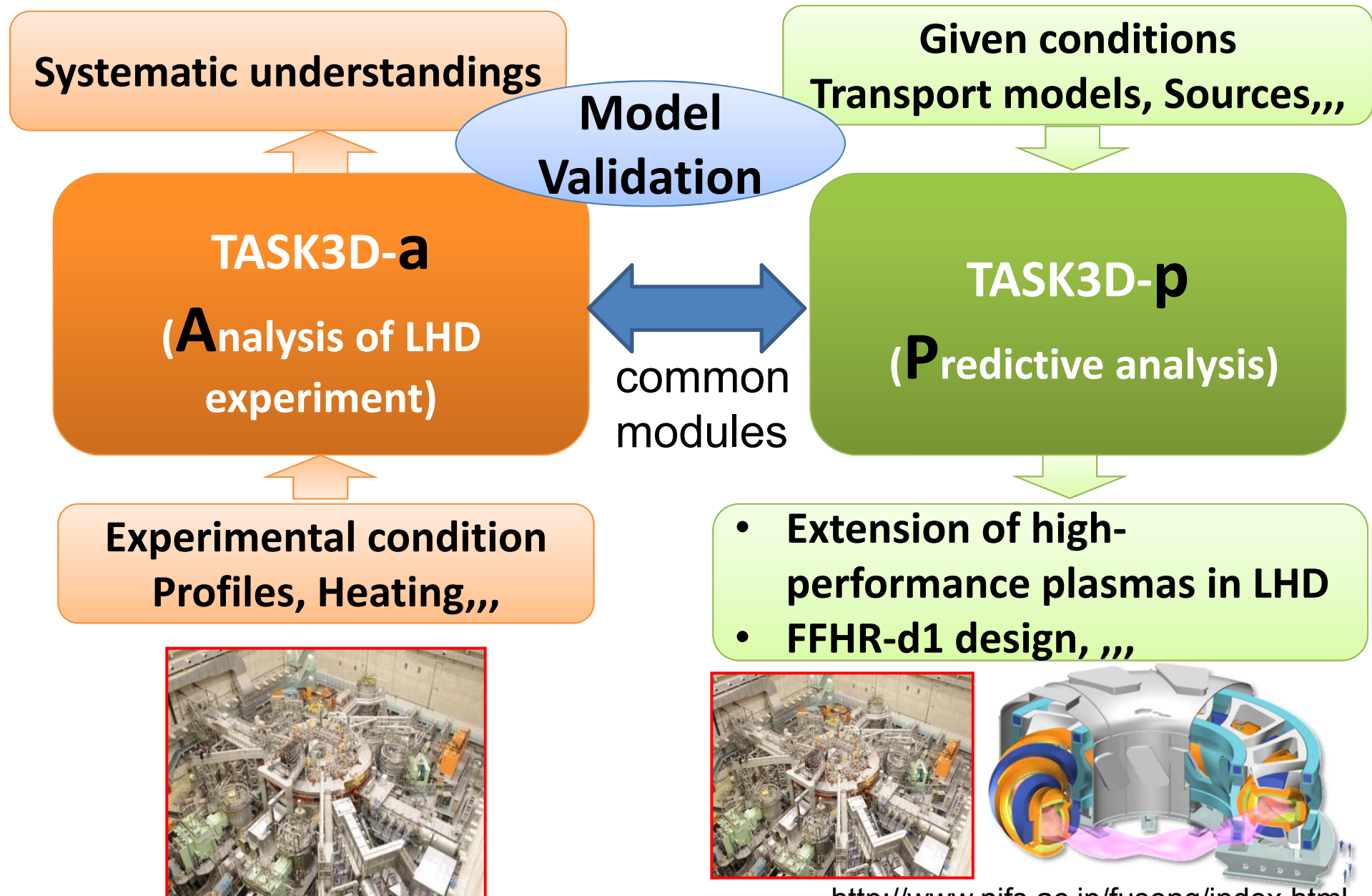


# Extension of integrated transport analysis suite, ***TASK3D- $\alpha$***

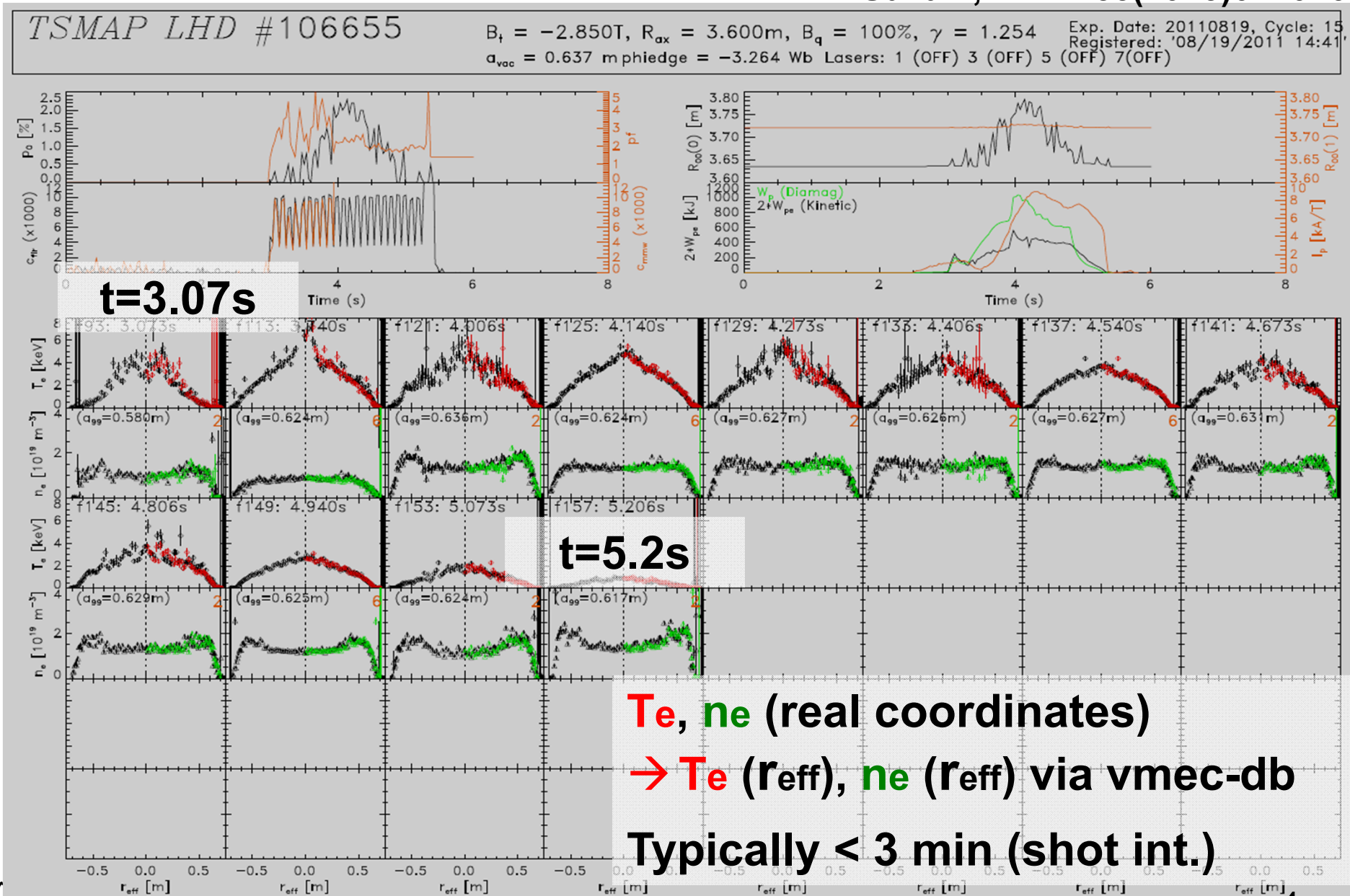
M.Yokoyama  
National Institute for Fusion Science

for integrated transport code group, NSRP  
with close collaboration with LHD Experiment group



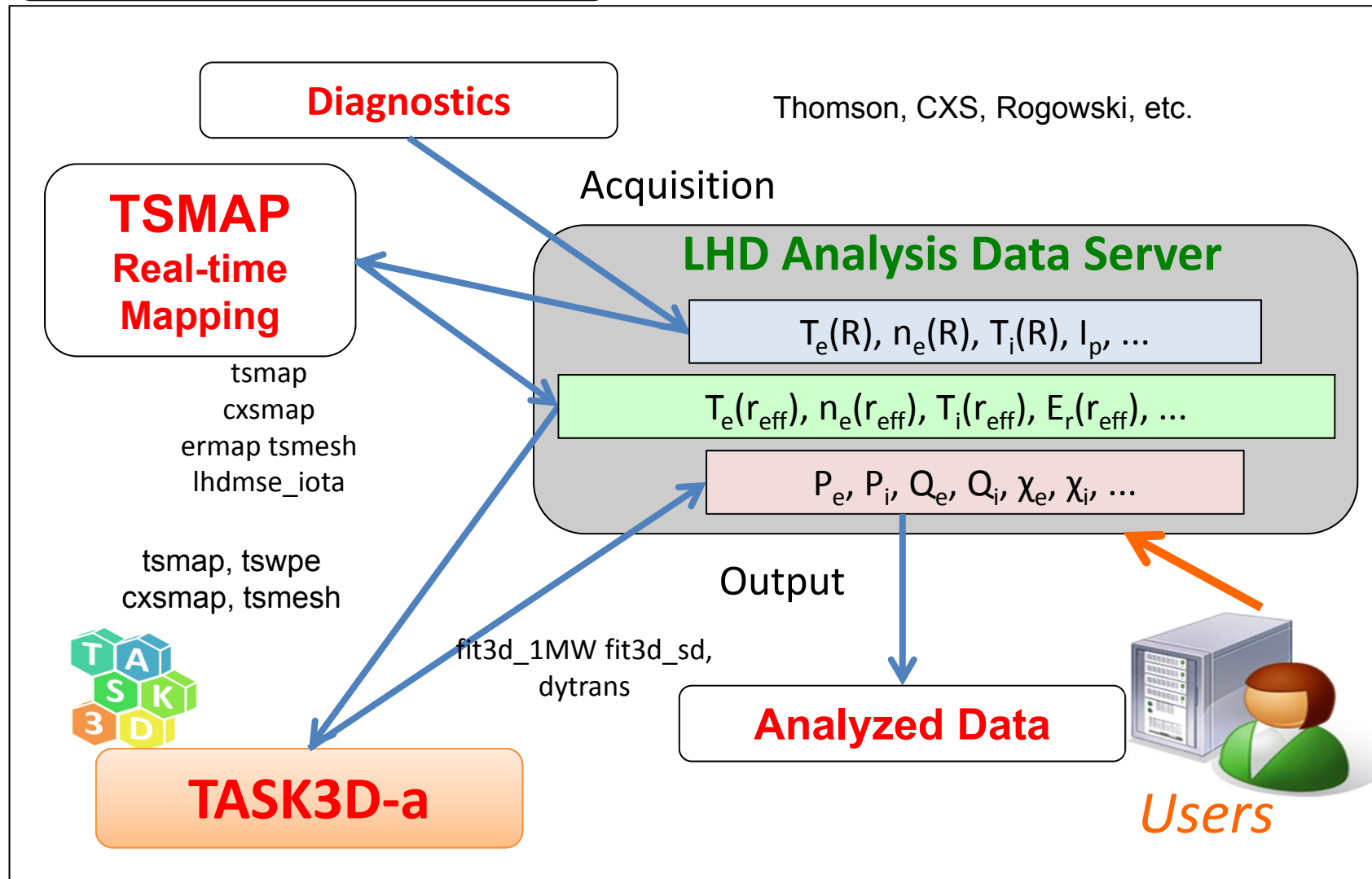
- “3D” blocks (**modules for “3D” physics**)
- Piling Up -> making shape (**integration**)
- bright colors (**friendly and productive collaboration**)

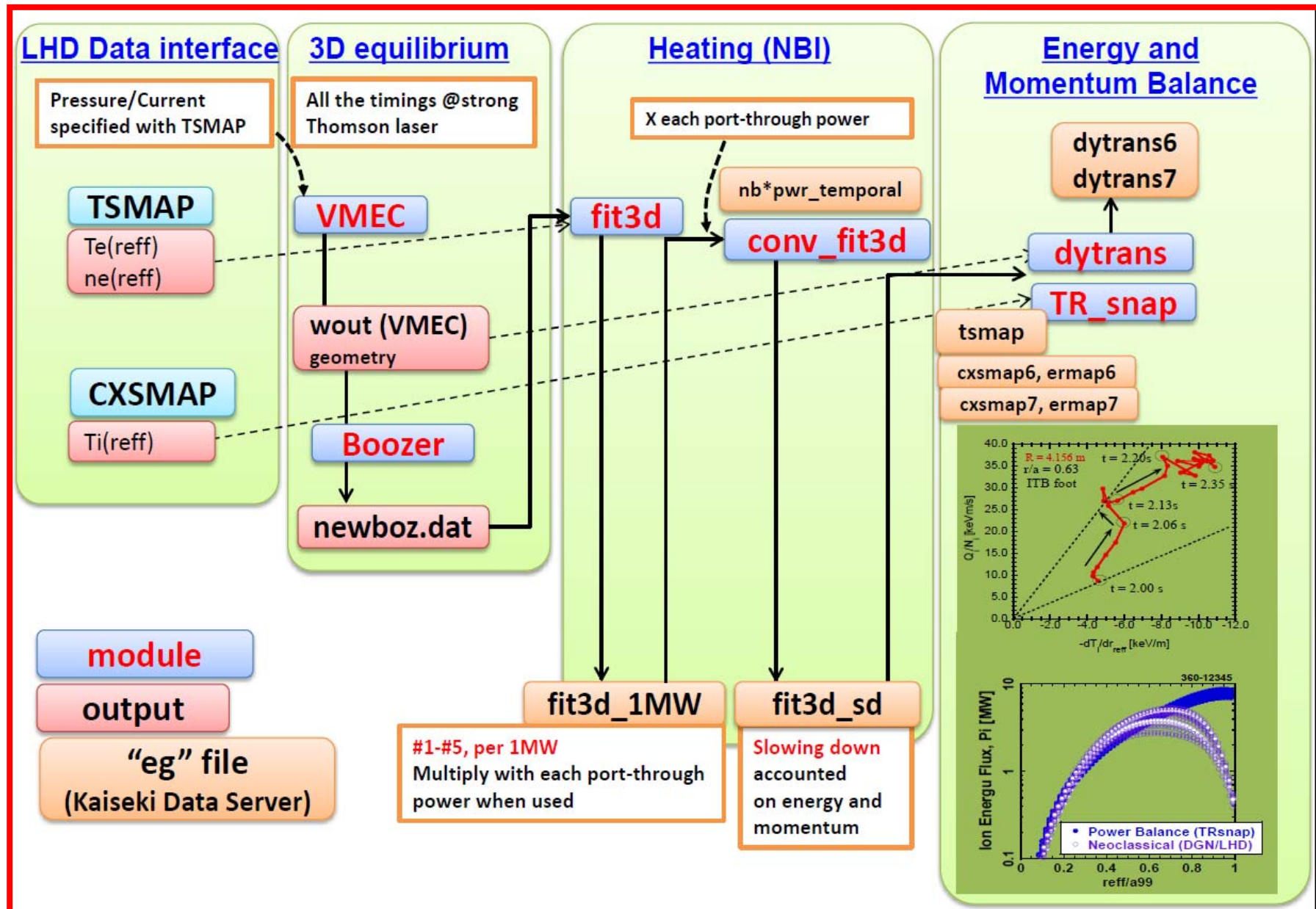




# Enhanced interaction between TASK3D-a and LHD Experiment Data

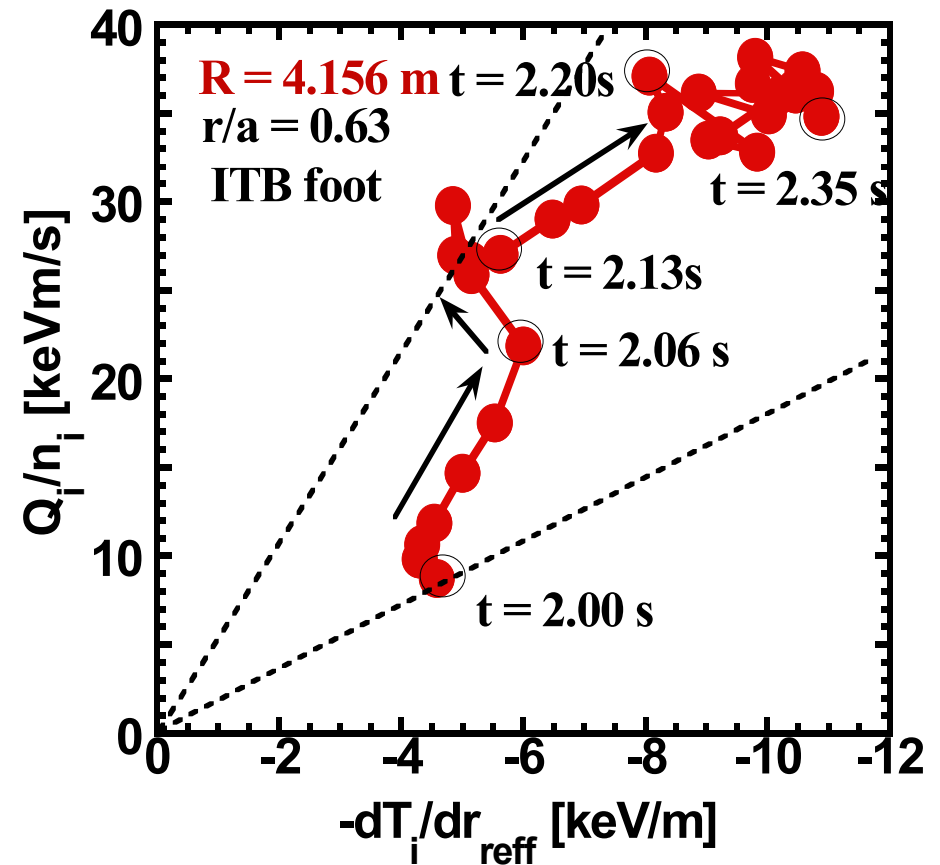
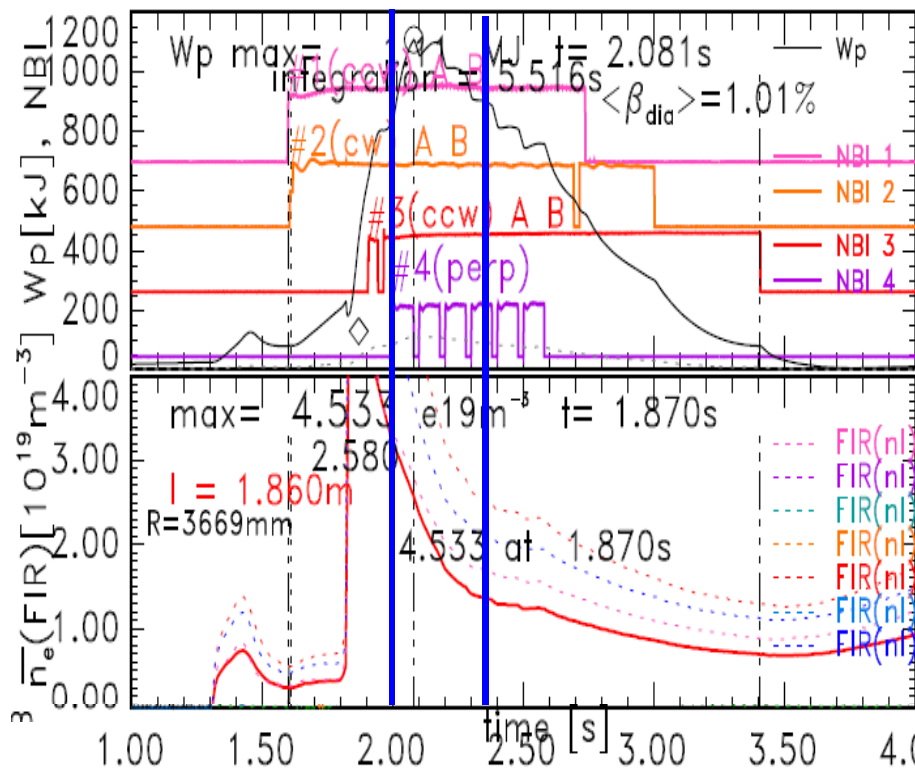
## Data Integration





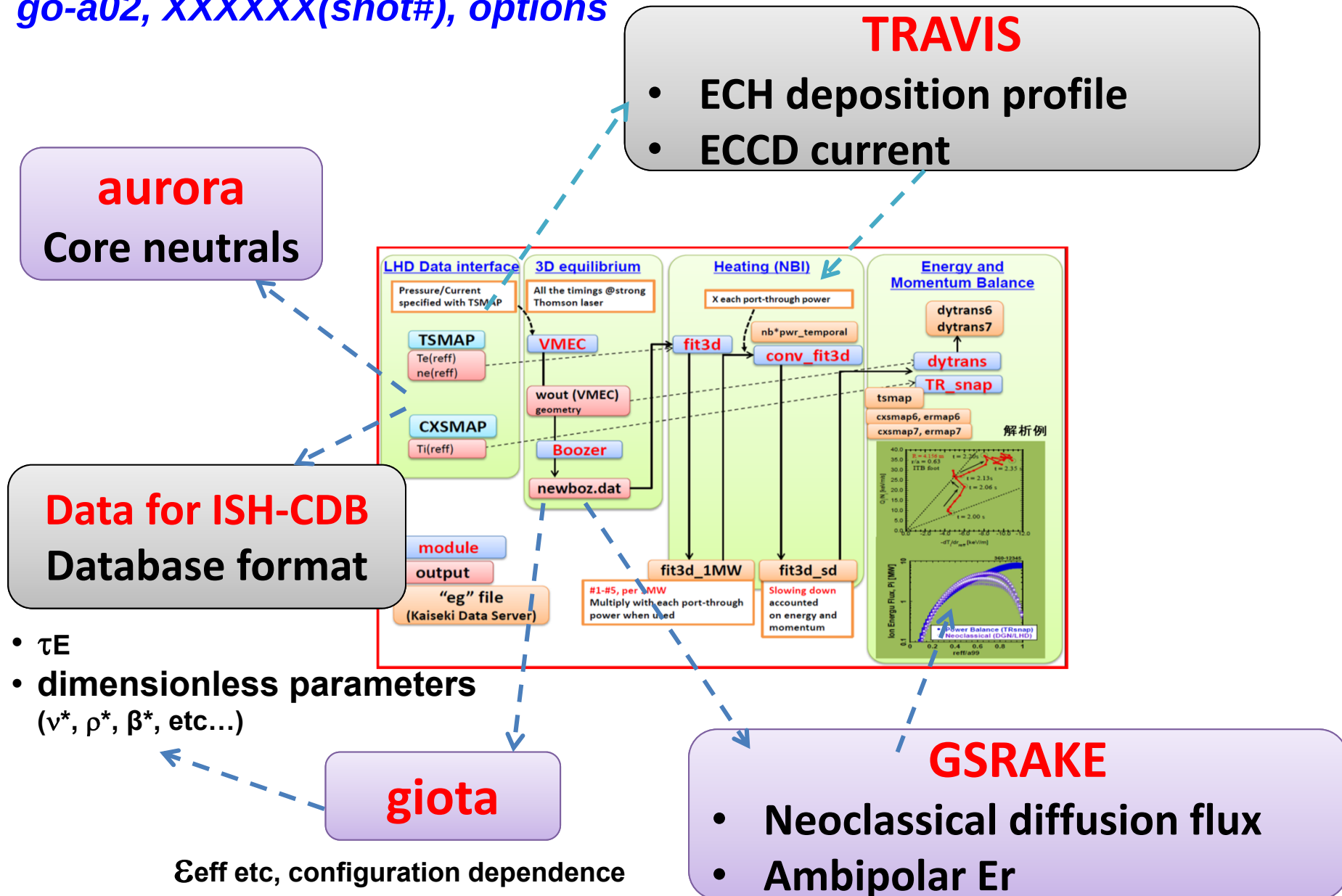
- Gateway established : [tmap-task3d.lhd.nifs.ac.jp](http://tmap-task3d.lhd.nifs.ac.jp)
  - ✓ open to collaborators
  - ✓ no need to download the suite nor set-up the environment in your own computer
- Standard usage :
  - ✓ simply “**go, #shot**”
  - ✓ not depend on who to run the suite
- Output: **eg** file format (on **LHD Data Server**)
  - ✓ accessible from collaborators

Number of analysis-cases can be significantly enhanced  
 → Systematic understandings, accurate discussion



timing can be identified for the confinement improvement

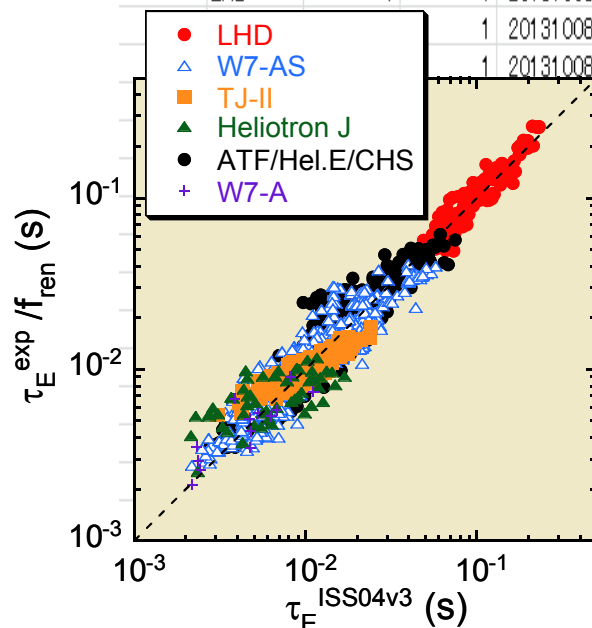
*go-a02, XXXXXX(shot#), options*



ishcdb

## Data submission to Stellarator-Heliotron Confinement Database

| comment | stellarator | sdtset | shear | indc | up date  | shot_date | shot#  | seq# | time(s) | phase | A | Z | A beam | Rgeo(m) | Rax(m) | Bq(%) | gamma | E      |
|---------|-------------|--------|-------|------|----------|-----------|--------|------|---------|-------|---|---|--------|---------|--------|-------|-------|--------|
|         | LHD         |        | 1     | 1    | 20131008 | 20101208  | 101950 |      | 3.05    |       |   | 1 | 1      | 1       | 3.721  | 3.6   | 100   | 1.2538 |
|         | LHD         |        | 1     | 1    | 20131008 | 20101208  | 101950 |      | 3.15    |       |   | 1 | 1      | 1       | 3.721  | 3.6   | 100   | 1.2538 |
|         | LHD         |        | 1     | 1    | 20131008 | 20101208  | 101950 |      | 3.25    |       |   | 1 | 1      | 1       | 3.721  | 3.6   | 100   | 1.2538 |
|         | LHD         |        | 1     | 1    | 20131008 | 20101208  | 101950 |      | 3.35    |       |   | 1 | 1      | 1       | 3.7209 | 3.6   | 100   | 1.2538 |
|         | LHD         |        | 1     | 1    | 20131008 | 20101208  | 101950 |      | 3.45    |       |   | 1 | 1      | 1       | 3.7229 | 3.6   | 100   | 1.2538 |
|         | LHD         |        | 1     | 1    | 20131008 | 20101208  | 101950 |      | 3.55    |       |   | 1 | 1      | 1       | 3.7248 | 3.6   | 100   | 1.2538 |
|         | LHD         |        | 1     | 1    | 20131008 | 20101208  | 101950 |      | 3.65    |       |   | 1 | 1      | 1       | 3.7259 | 3.6   | 100   | 1.2538 |
|         | LHD         |        | 1     | 1    | 20131008 | 20101208  | 101950 |      | 3.75    |       |   | 1 | 1      | 1       | 3.7264 | 3.6   | 100   | 1.2538 |
|         | LHD         |        | 1     | 1    | 20131008 | 20101208  | 101950 |      | 3.85    |       |   | 1 | 1      | 1       | 3.7263 | 3.6   | 100   | 1.2538 |
|         | LHD         |        | 1     | 1    | 20131008 | 20101208  | 101950 |      | 3.95    |       |   | 1 | 1      | 1       | 3.7321 | 3.6   | 100   | 1.2538 |
|         | LHD         |        | 1     | 1    | 20131008 | 20101208  | 101950 |      | 4.05    |       |   | 1 | 1      | 1       | 3.7284 | 3.6   | 100   | 1.2538 |
|         | LHD         |        | 1     | 1    | 20131008 | 20101208  | 101950 |      | 4.15    |       |   | 1 | 1      | 1       | 3.7289 | 3.6   | 100   | 1.2538 |
|         | LHD         |        | 1     | 1    | 20131008 | 20101208  | 101950 |      | 4.25    |       |   | 1 | 1      | 1       | 3.7288 | 3.6   | 100   | 1.2538 |
|         |             |        | 1     | 1    | 20131008 | 20101208  | 101950 |      | 4.35    |       |   | 1 | 1      | 1       | 3.7289 | 3.6   | 100   | 1.2538 |
|         |             |        | 1     | 1    | 20131008 | 20101208  | 101950 |      | 4.45    |       |   | 1 | 1      | 1       | 3.7281 | 3.6   | 100   | 1.2538 |
|         |             |        |       |      |          | 20101208  | 101950 |      | 4.55    |       |   | 1 | 1      | 1       | 3.728  | 3.6   | 100   | 1.2538 |
|         |             |        |       |      |          | 20101208  | 101950 |      | 4.65    |       |   | 1 | 1      | 1       | 3.7276 | 3.6   | 100   | 1.2538 |
|         |             |        |       |      |          | 20101208  | 101950 |      | 4.75    |       |   | 1 | 1      | 1       | 3.7272 | 3.6   | 100   | 1.2538 |
|         |             |        |       |      |          | 20101208  | 101950 |      | 4.85    |       |   | 1 | 1      | 1       | 3.7271 | 3.6   | 100   | 1.2538 |
|         |             |        |       |      |          | 20101208  | 101950 |      | 4.95    |       |   | 1 | 1      | 1       | 3.7271 | 3.6   | 100   | 1.2538 |
|         |             |        |       |      |          | 20101208  | 101950 |      | 5.05    |       |   | 1 | 1      | 1       | 3.7253 | 3.6   | 100   | 1.2538 |
|         |             |        |       |      |          | 20101208  | 101950 |      | 5.15    |       |   | 1 | 1      | 1       | 3.7237 | 3.6   | 100   | 1.2538 |
|         |             |        |       |      |          | 20101208  | 101950 |      | 5.25    |       |   | 1 | 1      | 1       | 3.7231 | 3.6   | 100   | 1.2538 |
|         |             |        |       |      |          | 20101208  | 101950 |      | 5.35    |       |   | 1 | 1      | 1       | 3.7223 | 3.6   | 100   | 1.2538 |
|         |             |        |       |      |          | 20101208  | 101950 |      | 5.45    |       |   | 1 | 1      | 1       | 3.7214 | 3.6   | 100   | 1.2538 |
|         |             |        |       |      |          | 20101208  | 101950 |      | 5.55    |       |   | 1 | 1      | 1       | 3.7214 | 3.6   | 100   | 1.2538 |

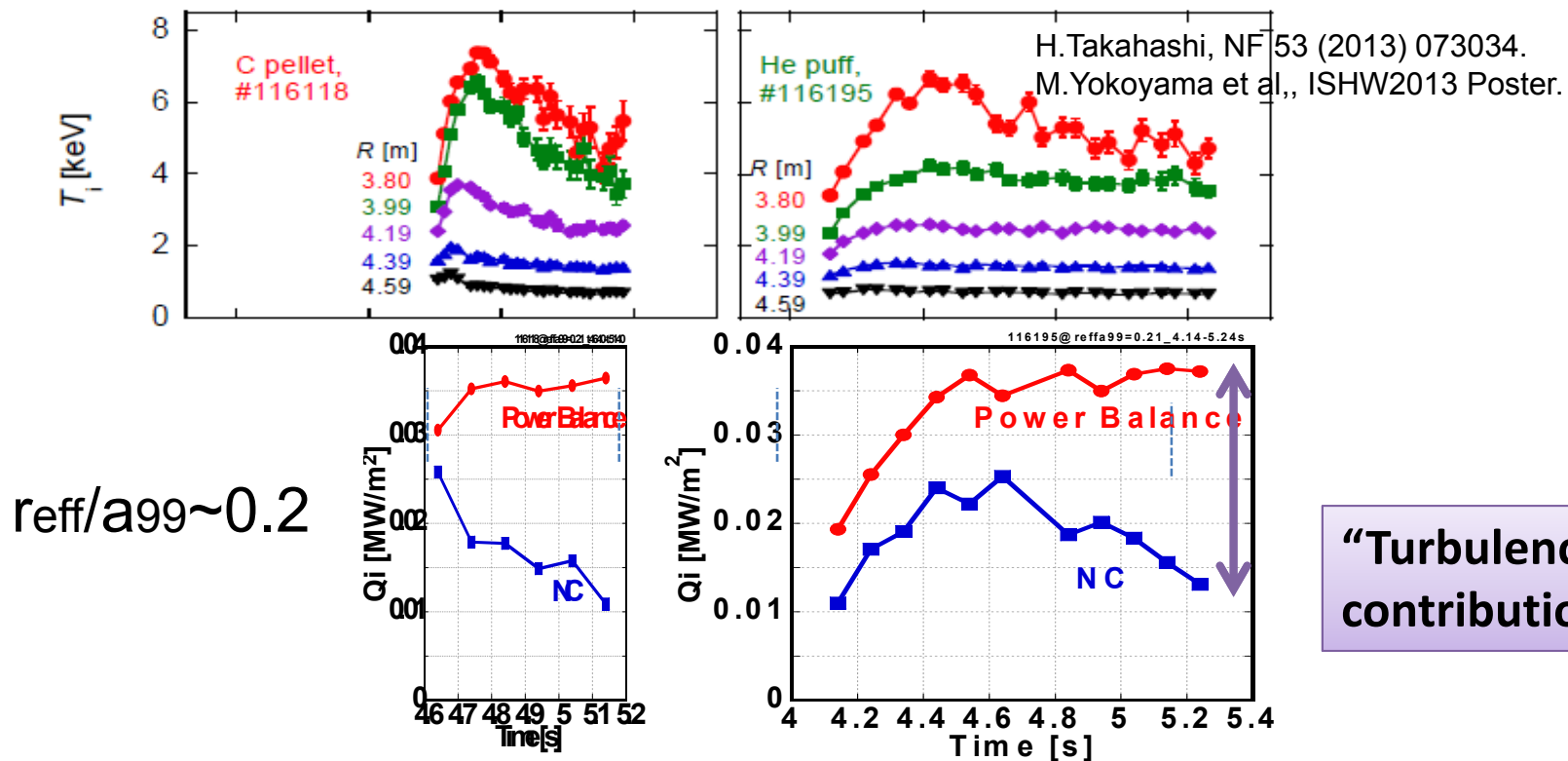


→ Extension of Stellarator-Heliotron Scaling including forthcoming W7-X results

## GSRAKE

C.D.Beidler, and W.D.D’haeseleer, PPCF 37 (1995) 463

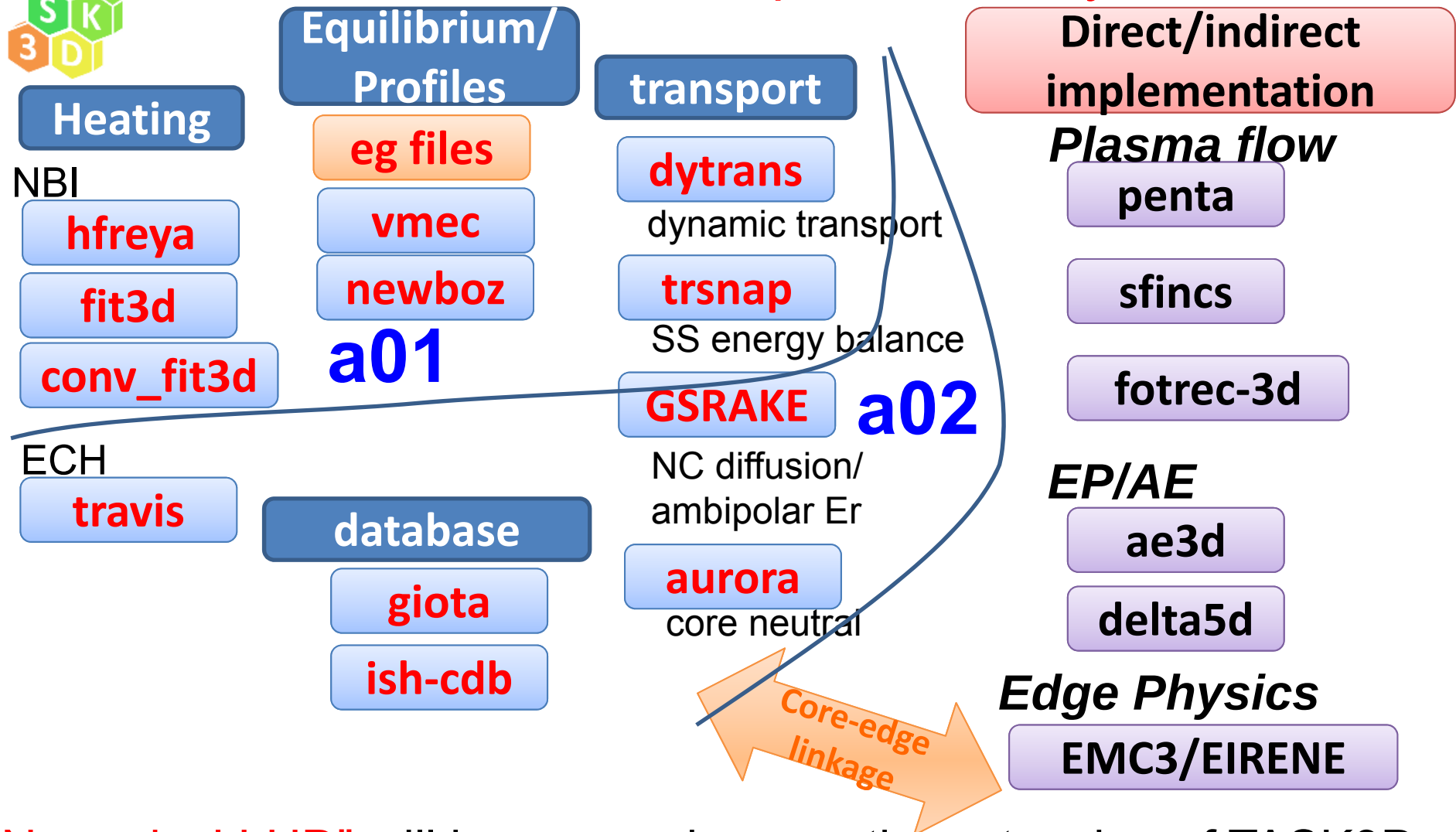
- Estimates of Neoclassical diffusion flux, ambipolar  $E_r$
  - Routine Comparison to “Experimental” Energy Balance
- **“Turbulence” Contribution**



Can be utilized for validation of turbulent transport simulation



## unified basis for LHD plasma analyses



“Numerical LHD” will be pursued through the extension of TASK3D-a



- ***TASK3D*** has been programmatically developed as “extension” of TASK (Prof. Fukuyama) to LHD Plasmas
- ***TASK3D- $\alpha$***  has been steadily extended, to make wide-range physics analyses of LHD plasmas, and provide unified basis for several simulation codes ~~ “Numerical LHD” is foreseen
- Extension of ***TASK3D- $\alpha$***  will facilitate code-validation activities upon LHD plasmas, and then will be the firm basis for ***TASK3D-p on the way to “Numerical Helical Reactor”***.