

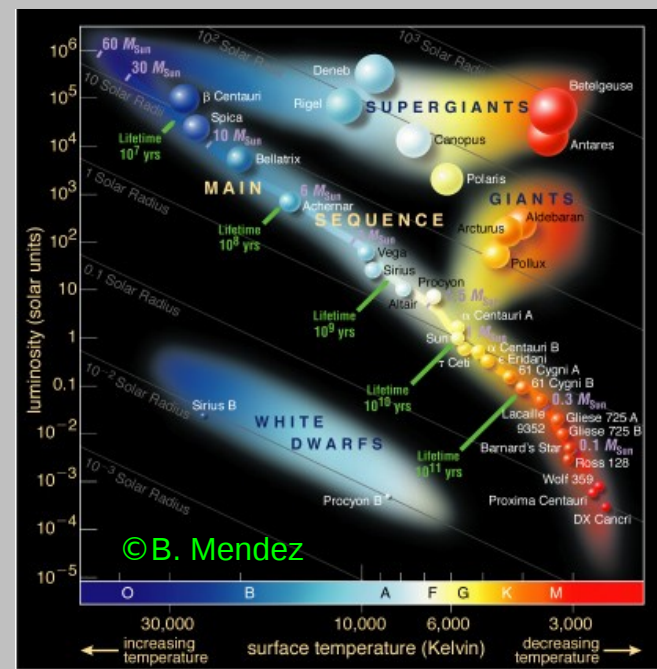
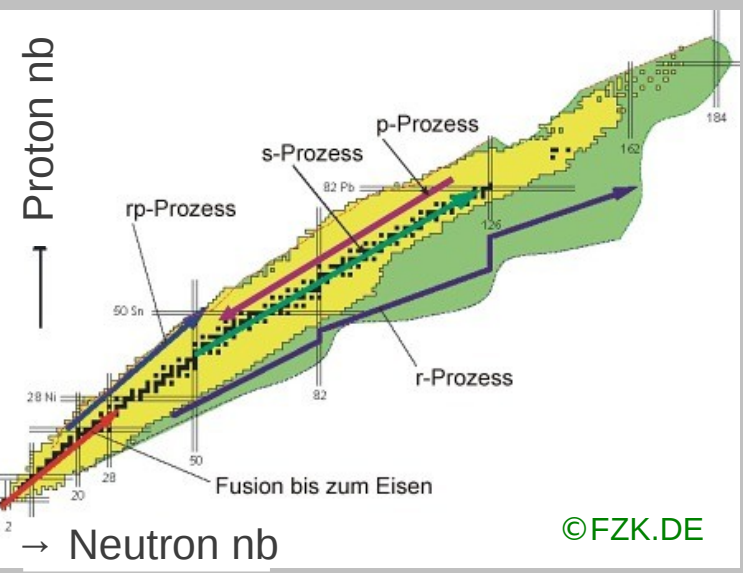
SHYNE:



Stellar HYdrodynamics
Nucleosynthesis & Evolution

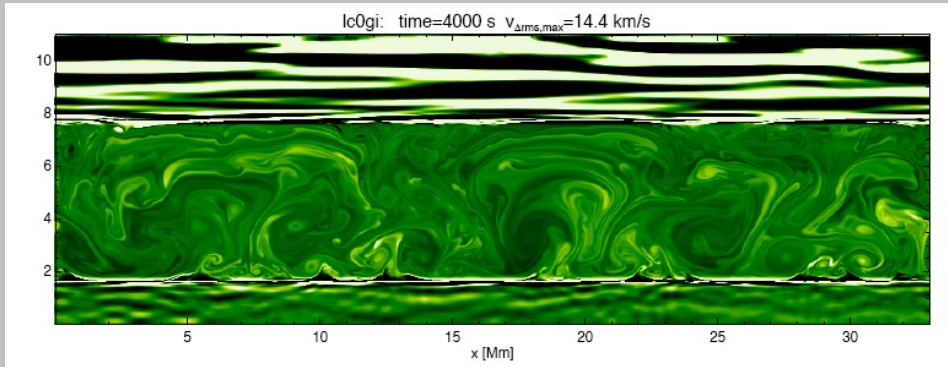
Raphael HIRSCHI

<http://www.astro.keele.ac.uk/shyne/>



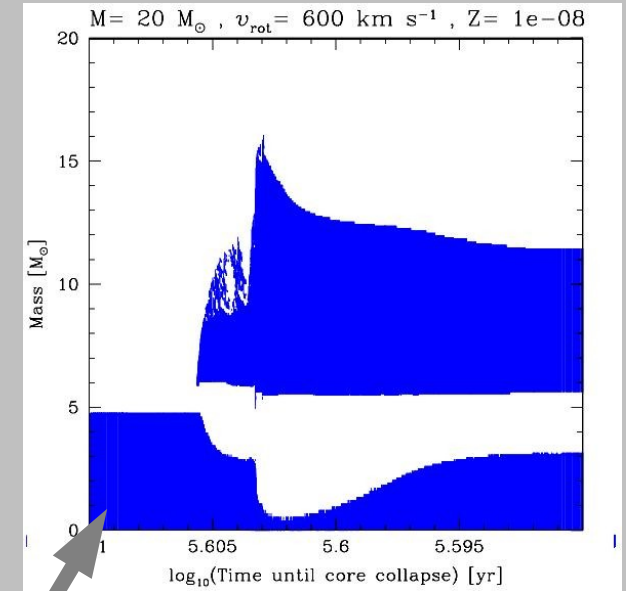
321D link

3D simulations

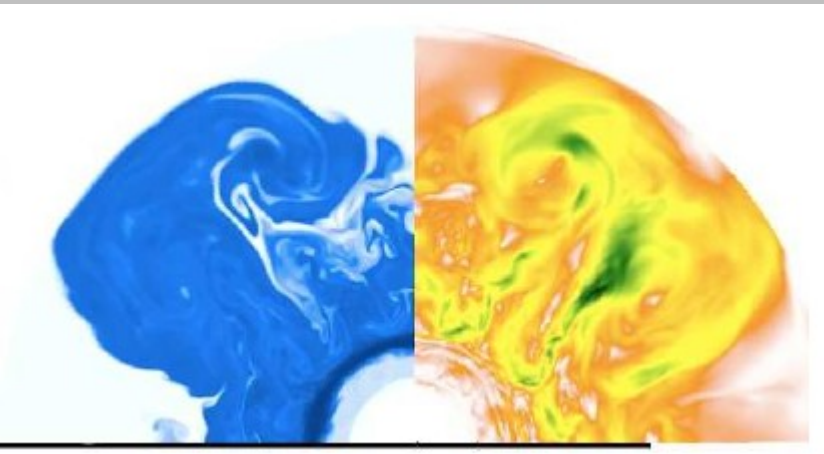


Herwig et al 06

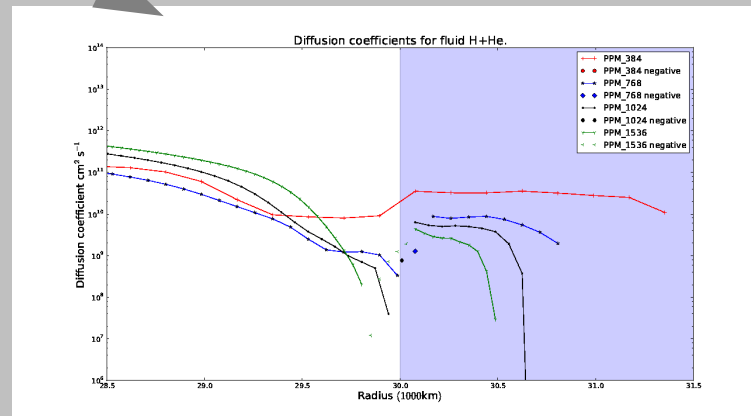
Uncertainties in 1D



e.g. Hirschi 07



e.g. Arnett & Meakin 2011
Mocak et al 2011, ...



Meakin et al 2009 ; Bennett et al in prep

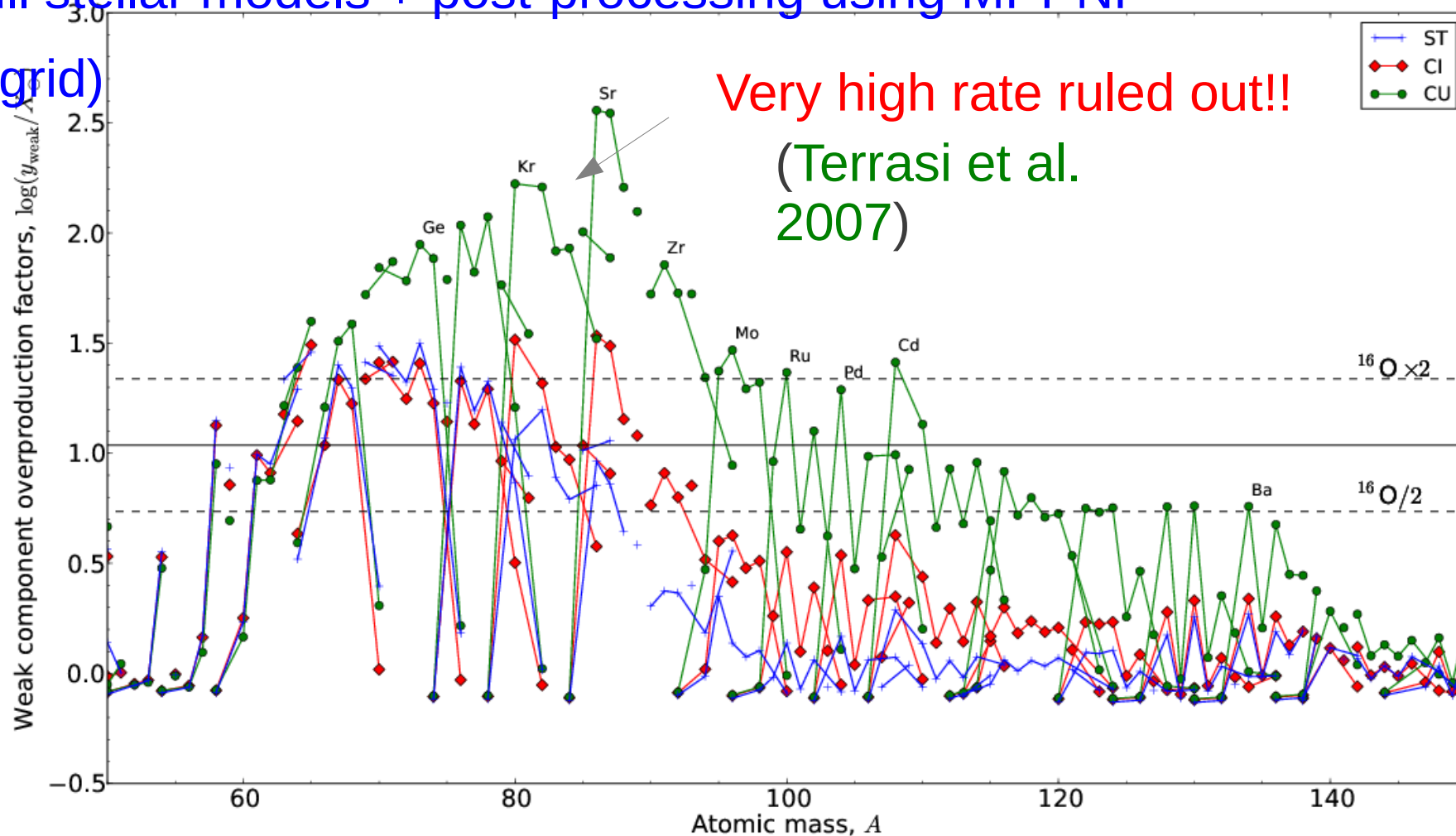
Determine effective diffusion (advection?) coefficient

Constraining Nuclear Physics with stellar evolution:

$^{12}\text{C}-^{12}\text{C}$ rate, 3α

- Full stellar models + post-processing using MPPNP

(Nugrid)



Bennett et al 2011 (see Pignatari et al 2013 for a discussion of different channels: a,n,p)

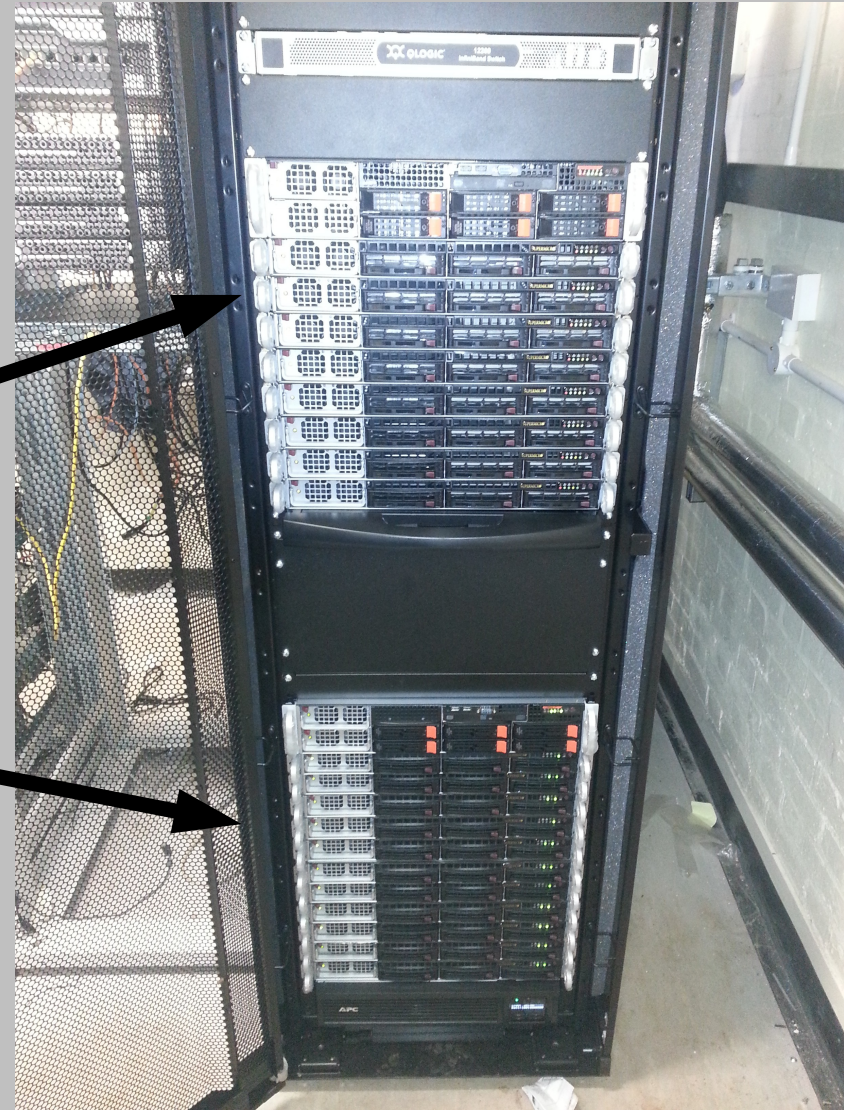
See Suda et al 2011 for a study constraining 3α reaction

SHYNE Computer Cluster

- The cluster comprises a total of 1056 AMD-based CPUs with 2GB RAM per CPU.

The main specifications are the following:

- 288 cores Numascale
 - 8 x 3 socket servers (each socket has 12 CPU cores)
 - Single memory image 576GB
 - Single operating system image
 - Numascale inter-connect
- 768 cores QDR Infiniband
 - 12 x 4 socket servers (each socket has 16 CPU cores)
 - 1 O/S per server
 - Distributed memory image 128 GB per server
- Unified cluster management for both architectures
 - IBM Platform HPC
 - 2 LSF queues Numa and IB
 - Numa nodes visible as single machine with 288 cores and 576 GB RAM
- Dedicated water cooled environment up to 30kW in 1 rack



SHYNE Computer Cluster

- Dedicated water cooled environment up to 30kW in 1 rack

Heat exchange



Fan



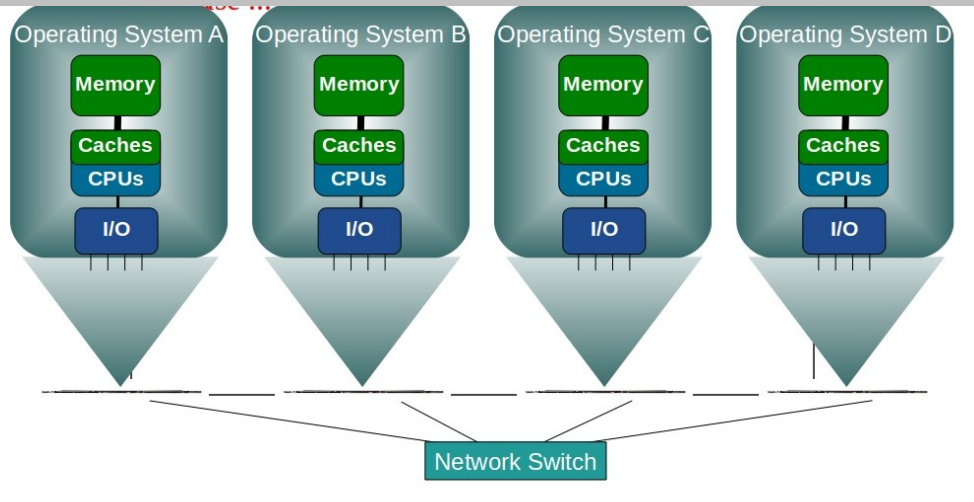
Chiller



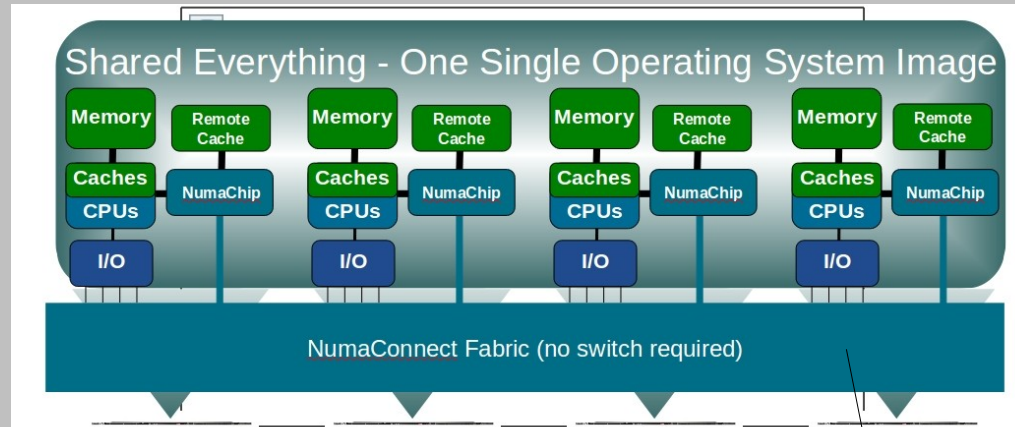
Super-Desktops

numascale

Norwegian HPC company



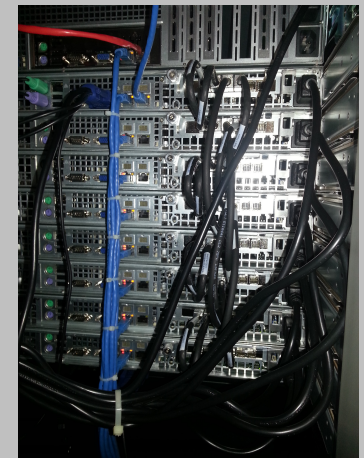
FROM: distributed memory clusters



TO: scalable shared memory clusters

For the same cost!

- Super-desktop: single OS, 288 CPUs, RAM 576 GB
- Large scale: better balance between shared/distributed memory



2D-torus