High Performance Computing 1b: Hydro Code

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The Hydro Code

The hydro code solves the Euler equations $\frac{\partial \vec{U}}{\partial t} + \vec{\nabla}\vec{F} = 0$, where $\vec{U} = (...)$ is the vector containing the conserved quantities ... and $\vec{F} = (...)$ blablabla for a two dimensional hydrodynamic simulation.
The simulation domain is rectangular, divided in square cells.
It uses a Godunov's scheme with an exact Riemann solver, which yields the following numerical equation to be solved for each cell of the domain and for both dimensions separately:

$$U_{i,j}^{n+1} = U_{i,j}^{n} + \frac{\Delta t}{\Delta x}\left(F_{x,i+\frac{1}{2}}^{n+\frac{1}{2}} - F_{x,i-\frac{1}{2}}^{n+\frac{1}{2}}\right)$$

Test Frametitle

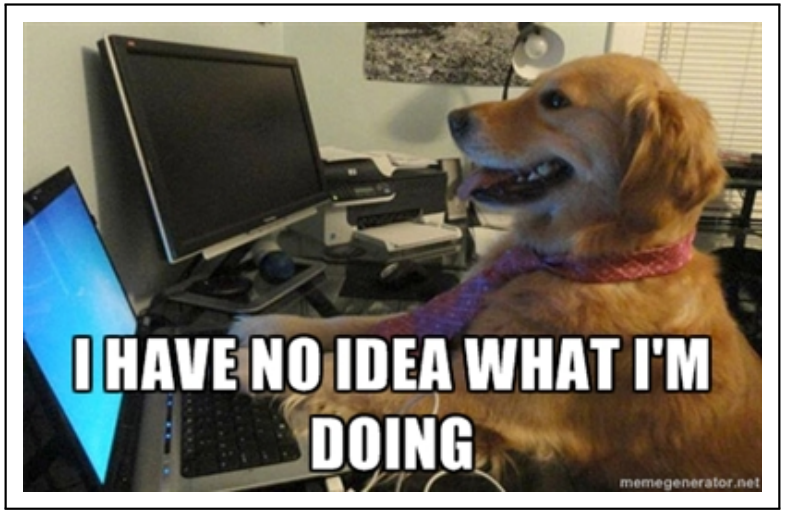
Test yo

- Test
- Test 2
- Test 3

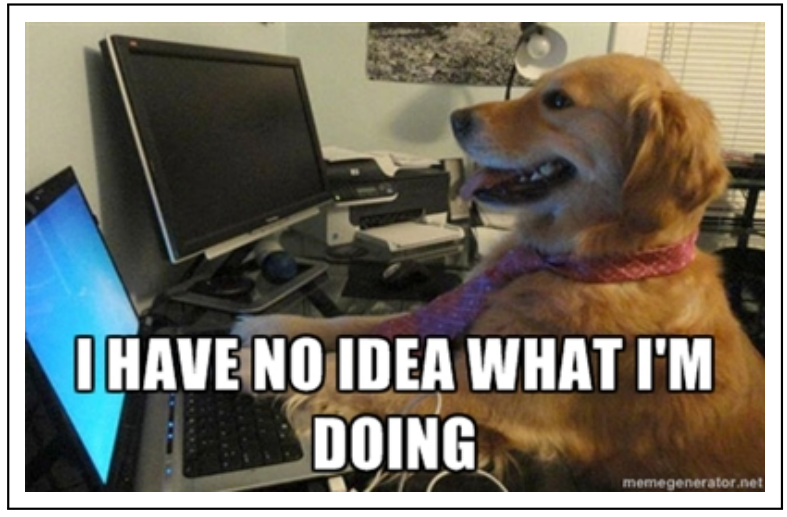
G_3': Die Menge R ist ausdrückbar.

WTF

Das hier: Description: Aufzählung ohne Punkte



RS-Flipflop



getaktetes RS-Flipflop

Blöcke

Einfacher Blocktitel
Einfacher Blocktext

Beispielblocktitel
Beispielblocktext

Warnungsblocktitel
Warnungsblocktext

Beweise etc

Proof.
Beweis □

Lemma (XY – Ein Dual zu YX)
Lemma

Theorem (T – Nach Tarski)
Theorem

Bemerkung
Bemerkung: zuerst

```
\newtheorem*{bem}{Bemerkung}
```

in Präambel setzen!

Overlays

- Einleitung
- daher
- aber Achtung!
- also so und so
- Schlussfolgerung

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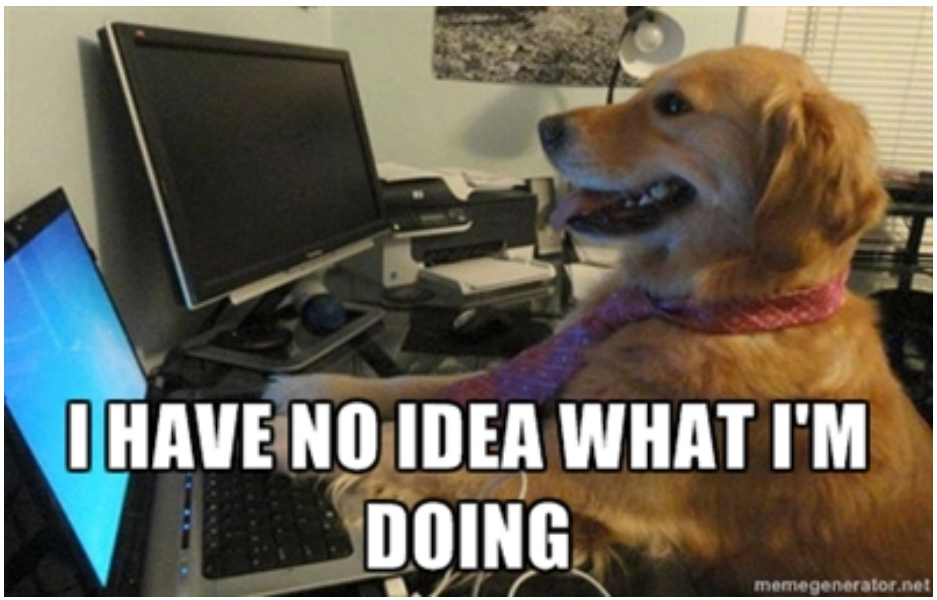
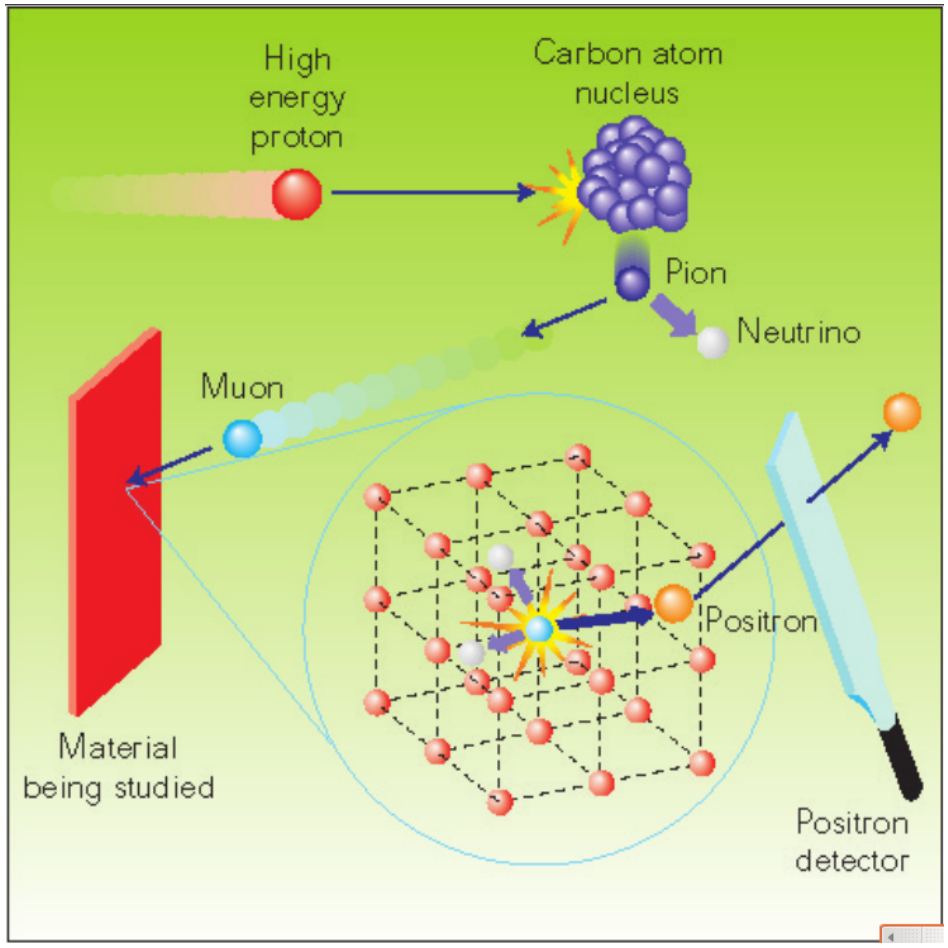
Zweispaltige Sachen



1. Start
2. Stopp

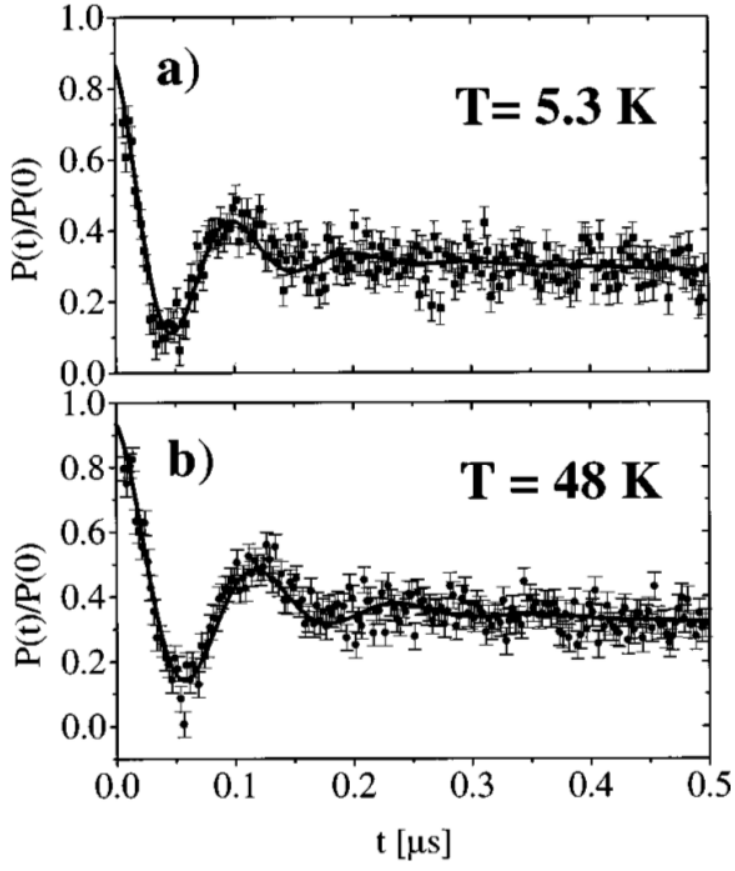
General principle of μSR



Dalmas de Réotier, Pierre (2010): *Introduction to muon spin rotation and relaxation (μSR)* [Online]. Availible: `http://inac.cea.fr/Pisp/pierre.dalmas-de-reotier/introduction_muSR.pdf`

Coexistence of ferromagnetism and superconductivity in $RuSr_2GdCu_2O_8$

- ferromagnetic phase is homogenous on a microscopic scale
- it accounts for most of the sample volume
- magnetic order is not significantly modified at the onset of superconductivity



Time-resolved normalised muon-spin polarisation $P(t)/P(t=0)$ at temperatures $T = 5.3K < T_{c,sc}$ and at $T_{c,sc} < T = 28K < T_{c,m}$. The large oscillatory component gives clear evidence for the presence of a magnetically ordered state.

C. Bernhard, J. L. Tallon, Ch. Niedermayer, Th. Blasius, A. Golnik, E. Brücher, R. K. Kremer, D. R. Noakes, C. E. Stronach, and E. J. Ansaldo, Phys. Rev. **B** 59, 14099 (1999)

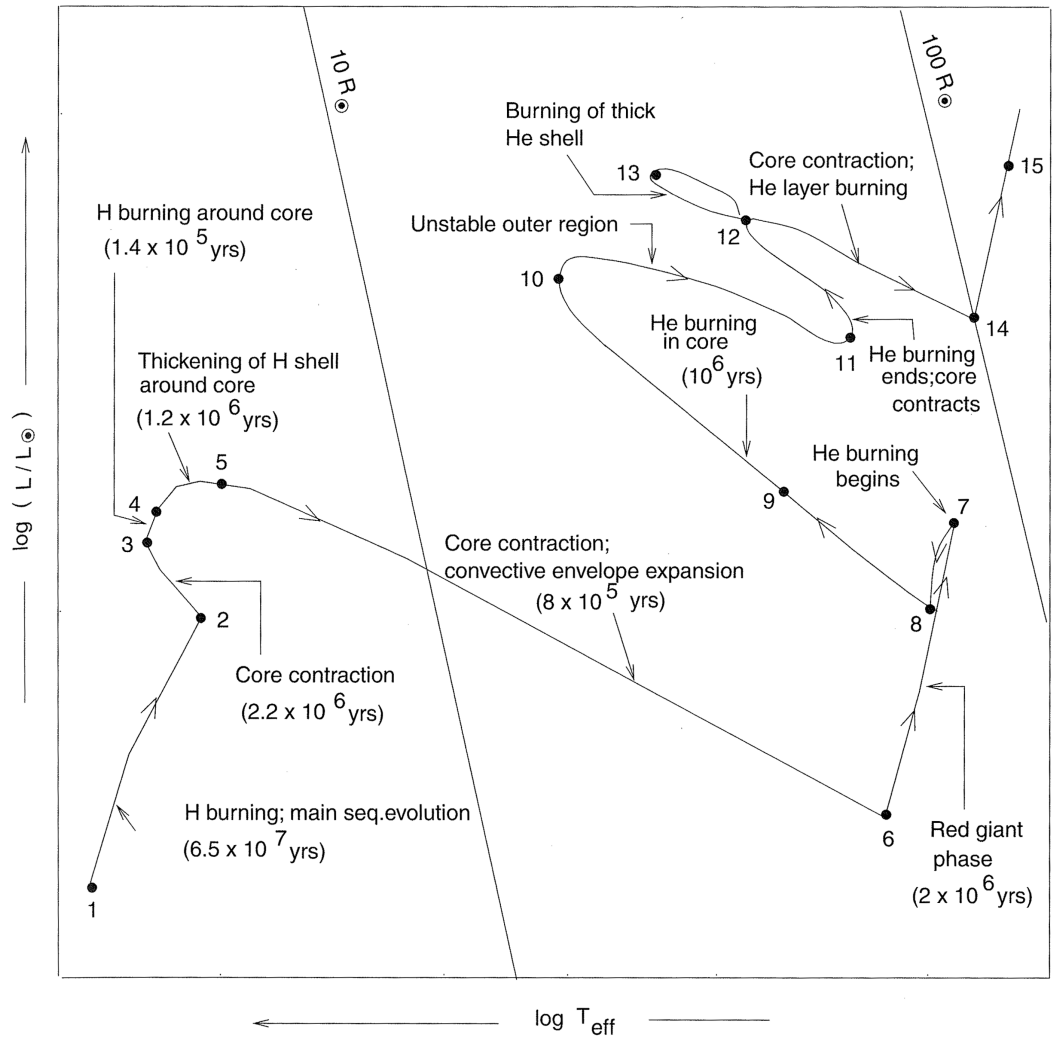
5 - 6

He core is homogenous (convective mixing). It will be nearly isothermal.

More and more *He* is produced by shell burning, the core becomes more massive

At some point, core cannot support envelope mass anymore:

$\Rightarrow$ core contracts, envelope expands



T. Padmanabhan, "Theoretical Astrophysics Volume II: Stars and Stellar Systems". New York: Cambridge University Press, 2001.