Description of 45-level test models

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Excitation model: 45-level H_2O with spectroscopy from JPL and collisional data from Green et al 1993.
See files [op]-h2o.dat for numerical values.
Ratio ortho/para H_2O = 3:1.

Cloud model: AGB star envelope

- outer radius 25 AU
- inner radius 2 AU
- H_2 density, T_{dust}, T_{kin}: tabulated (see file mc_100.d)
- Radial & turbulent velocity: tabulated (see file mc_100.d)
- External radiation: only the CMB (2.73 K).

Inside the inner radius, the density is constant (given by $n(H_2)$ at R_{in}); space is empty outside R_{out}. The H_2 column density in a pencil beam from center to edge is 9.785×10^{23} cm^{-2}.

Remember to add the thermal line broadening!

Dust model: after Hildebrand (1983) and Mathis (1990).
κ (250 μm) = 10.0 cm^2 per gram of dust
$\kappa \propto \lambda^{\beta}$, with
$\beta = 2.0$ ($\lambda > 250$ μm)
$\beta = 1.3$ ($\lambda < 250$ μm)
(Simple-minded dust model without silicate resonances in the interest of clarity).

Numerical details: 100 radial shells (see file mc_100.d); converged when fractional change in level populations $< 10^{-3}$.

Parameters: abundance of (ortho+para) H_2O of 10^{-6}, 10^{-4}.

Hint: the solution is far from LTE, so it is probably best not to use LTE as starting condition.

Send your solution in the form of tabulated level populations to Floris before March 1st, 2004.