

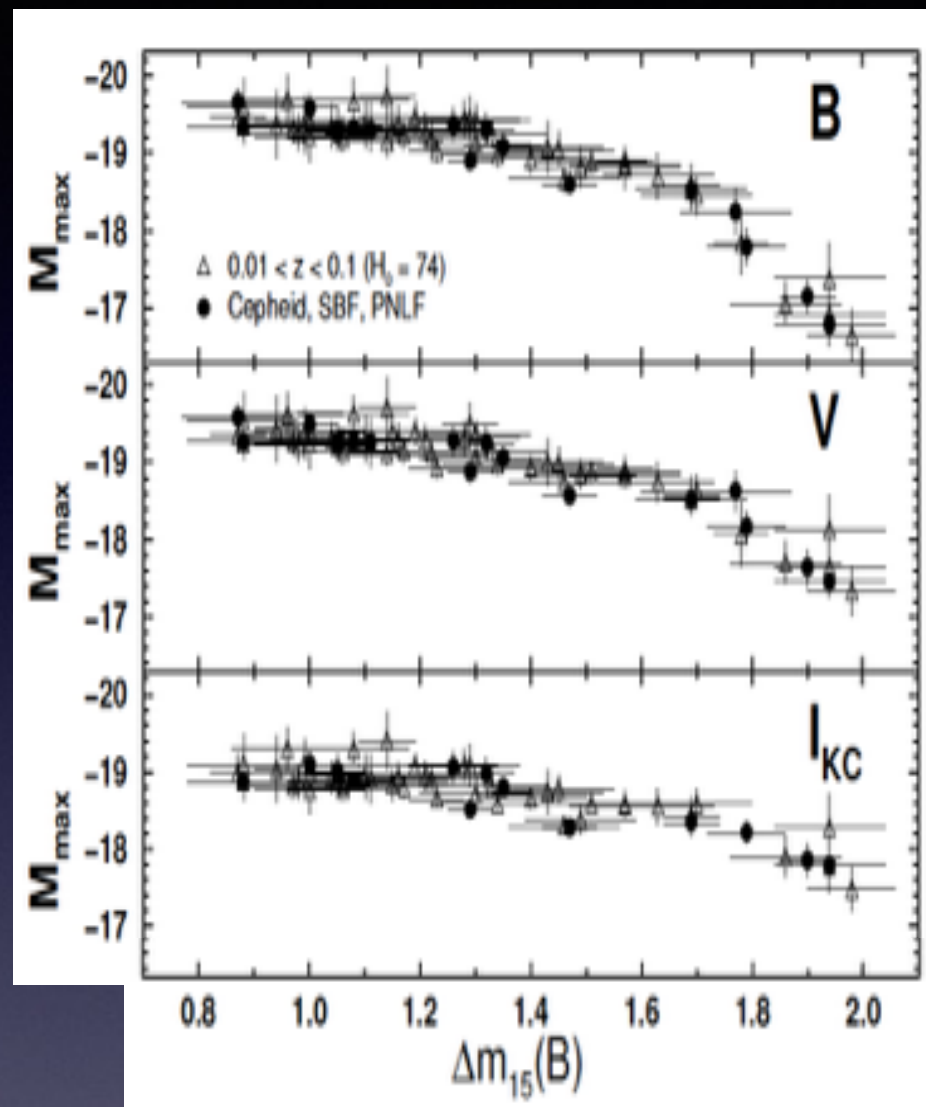
Bolometric LCs, Gamma-rays and Column densities

(Jefferey 99

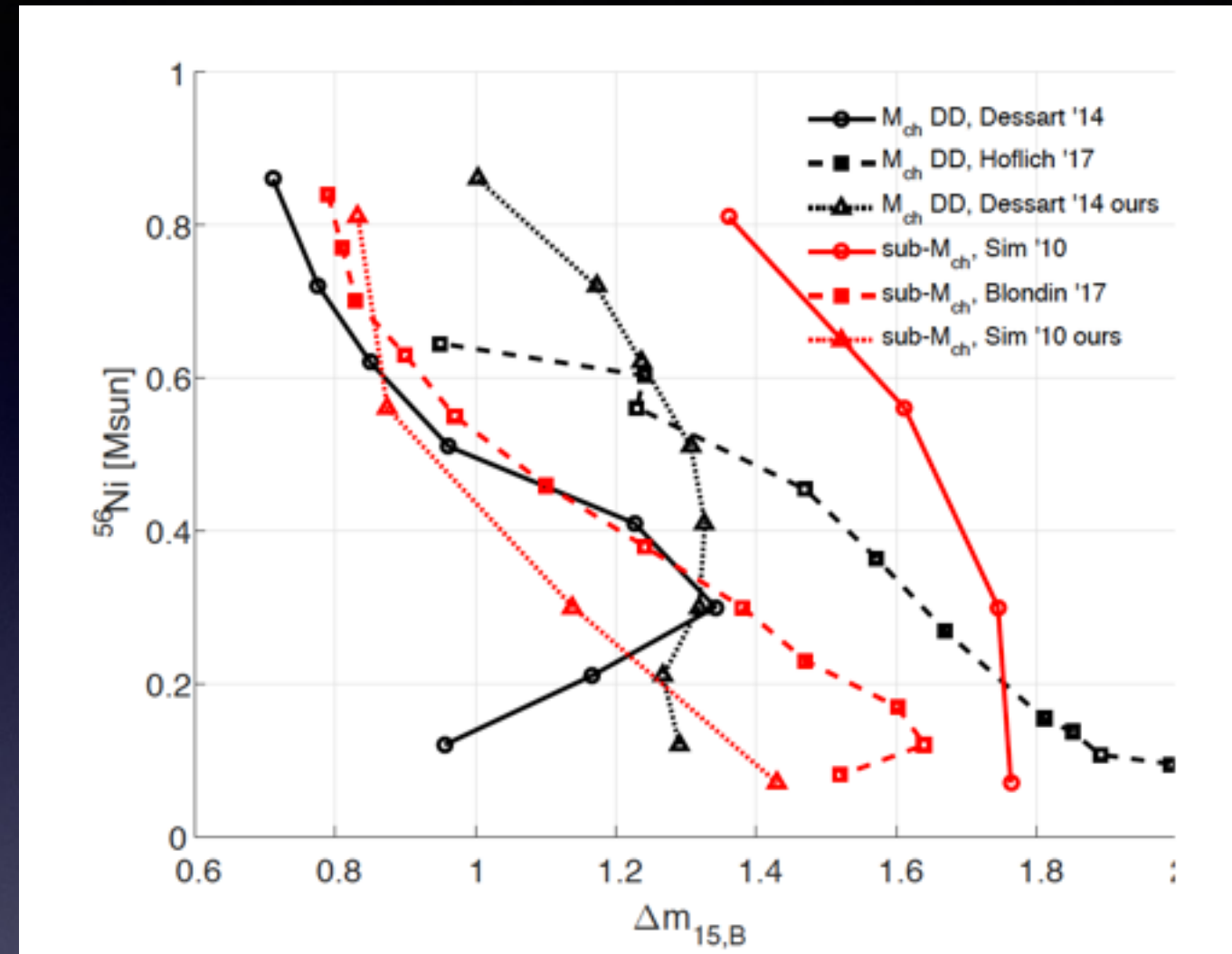
Clocchiatti & Wheeler 97)

Nahliel Wygoda, Yoni Elbaz, Doron Kushnir,
Subo Dong

Radiation transfer is hard



Phillips 05



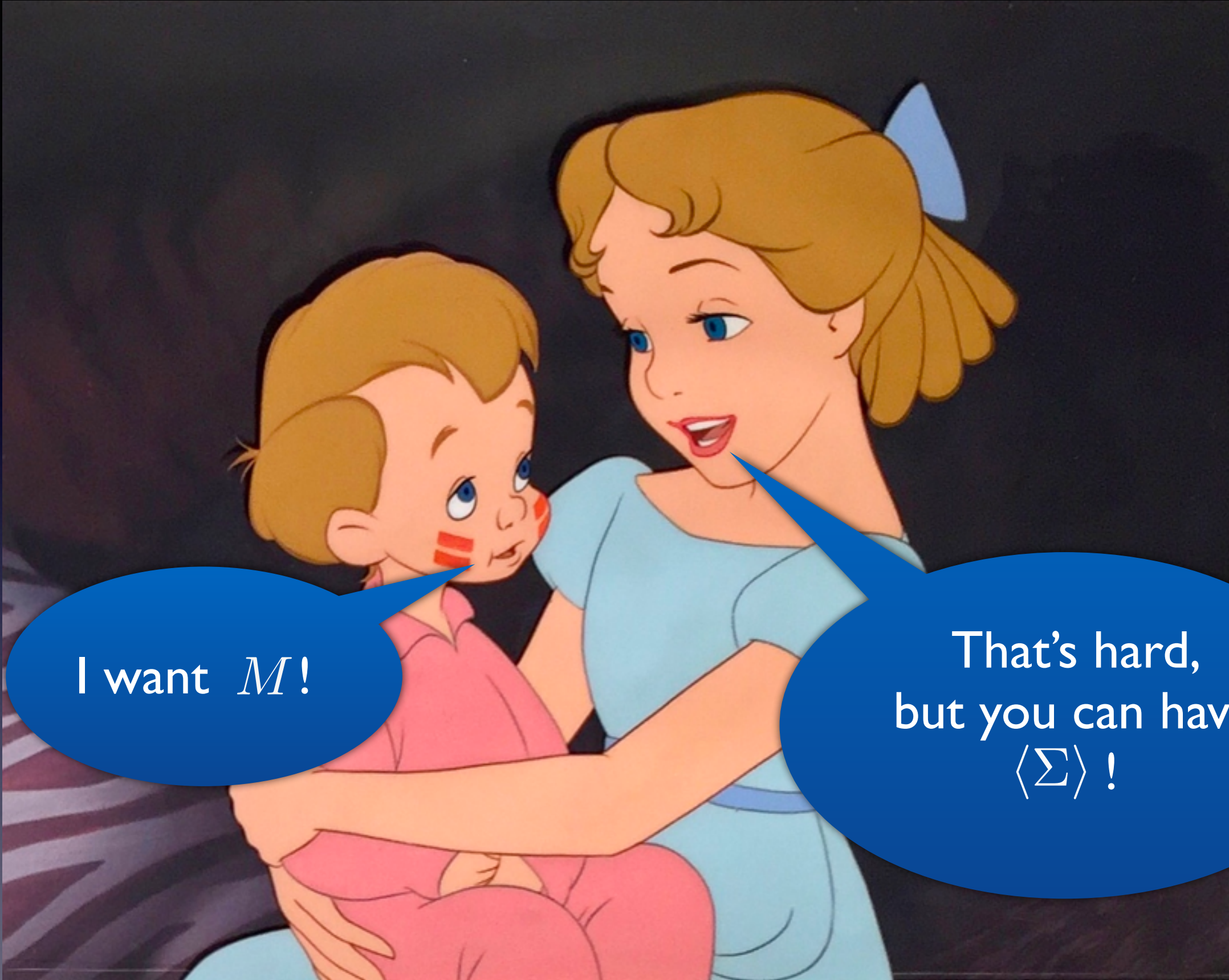
Wygoda+18

Search for **robust** middle ground

Theory:
Mass
...
Not
Observed

Bolometric light curves
?

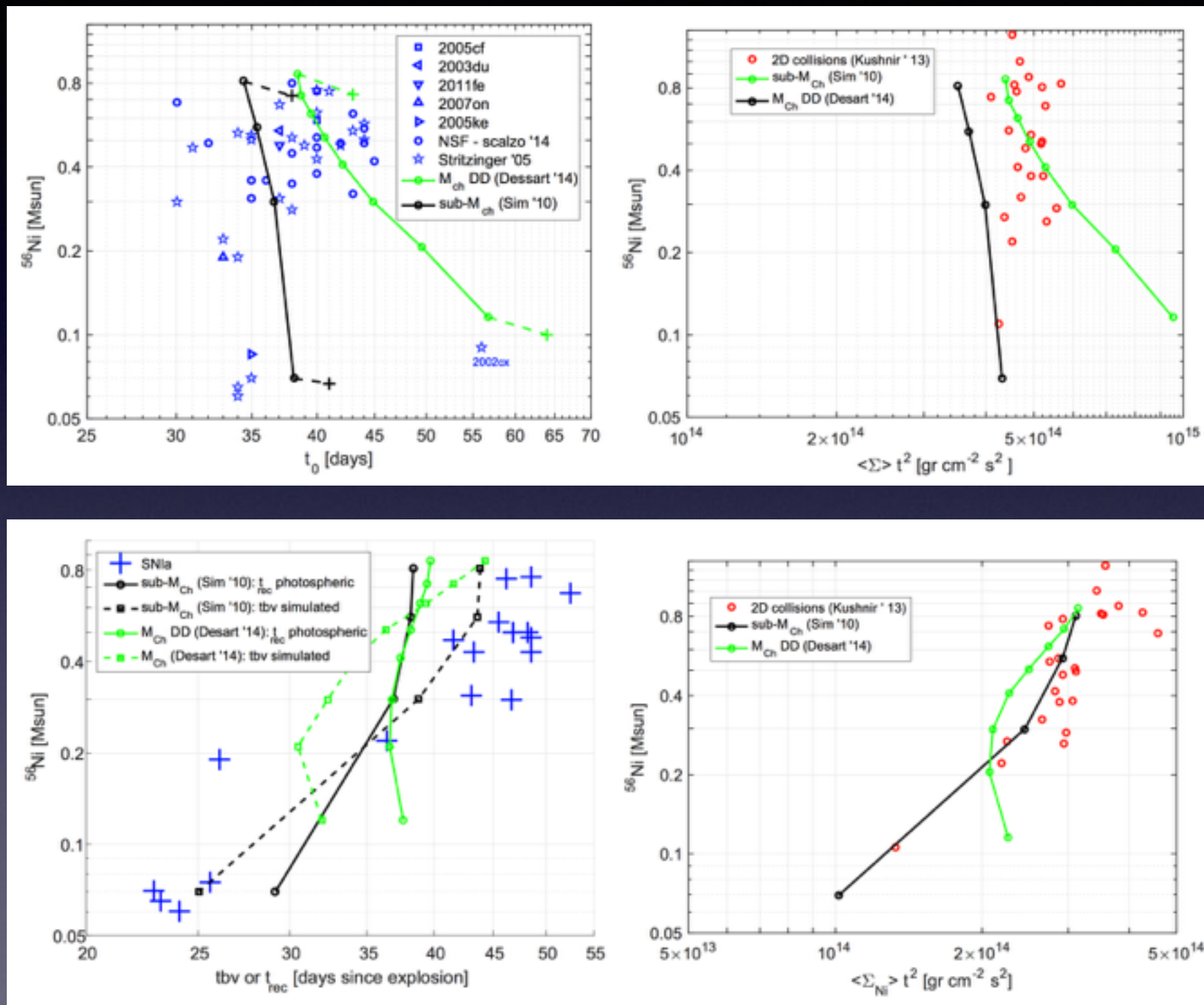
Observations:
dm15
...
Not
Calculable
Reliably



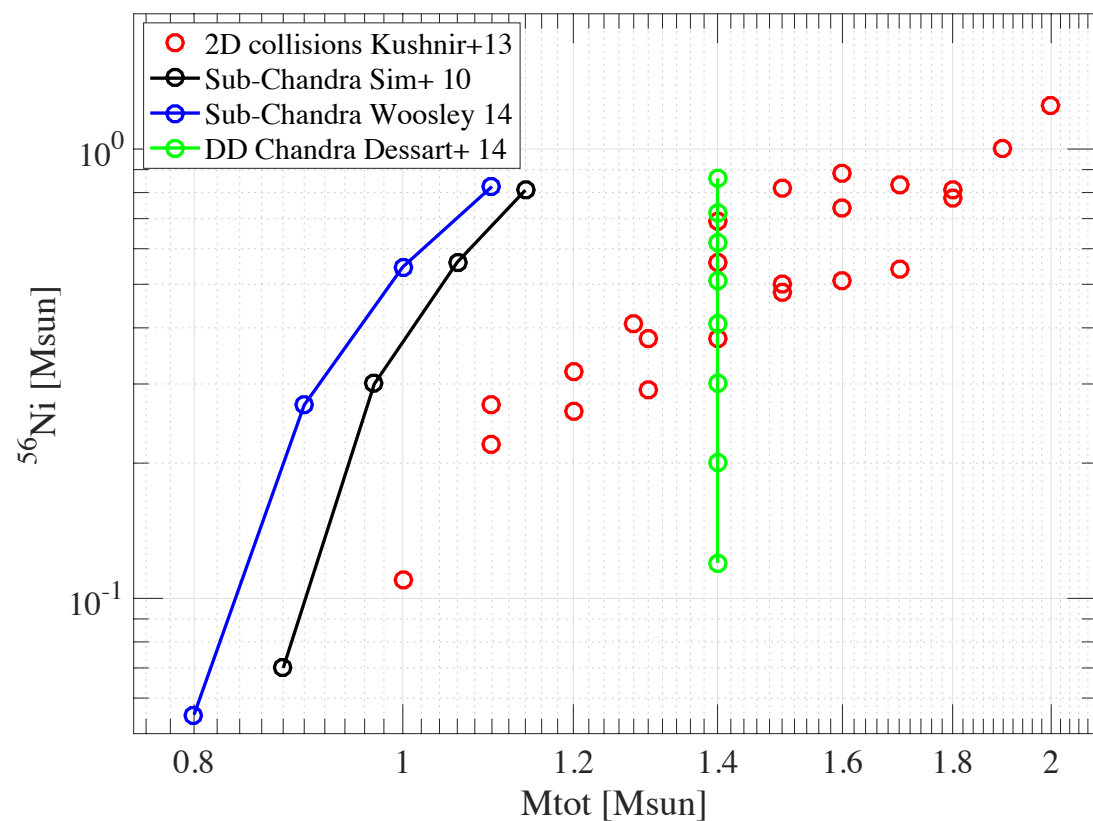
I want M !

That's hard,
but you can have
 $\langle \Sigma \rangle$!

Column densities are important

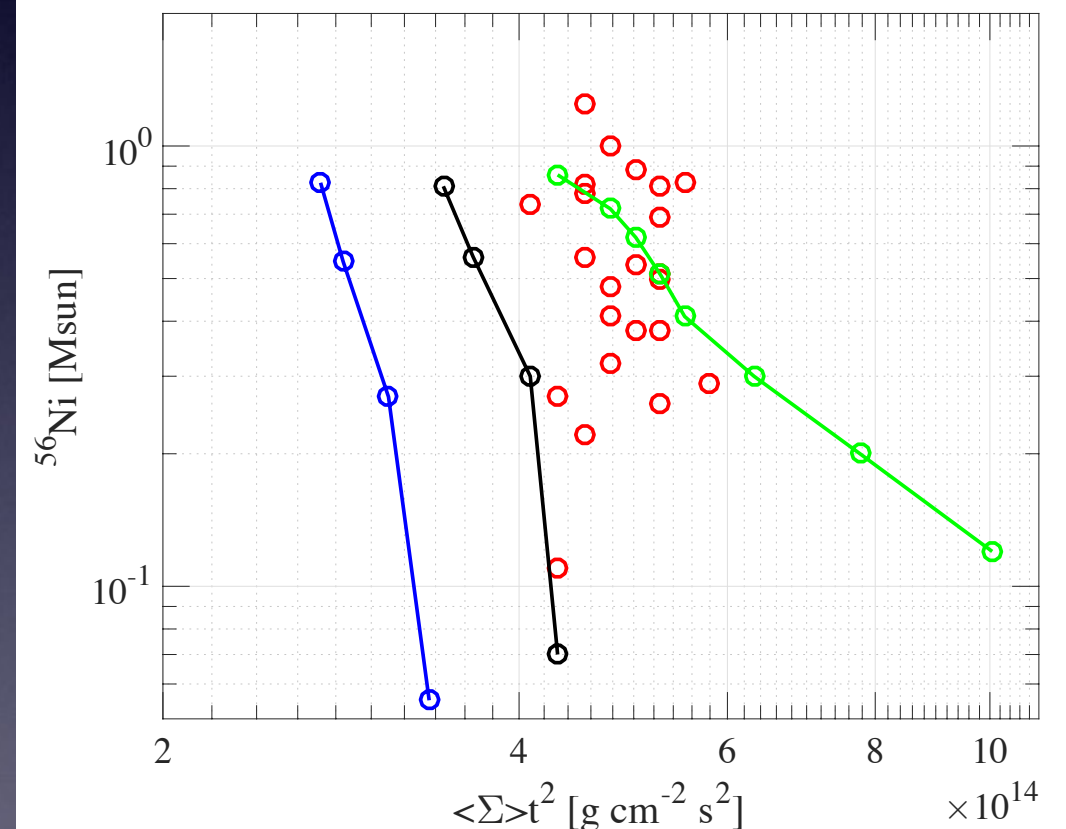
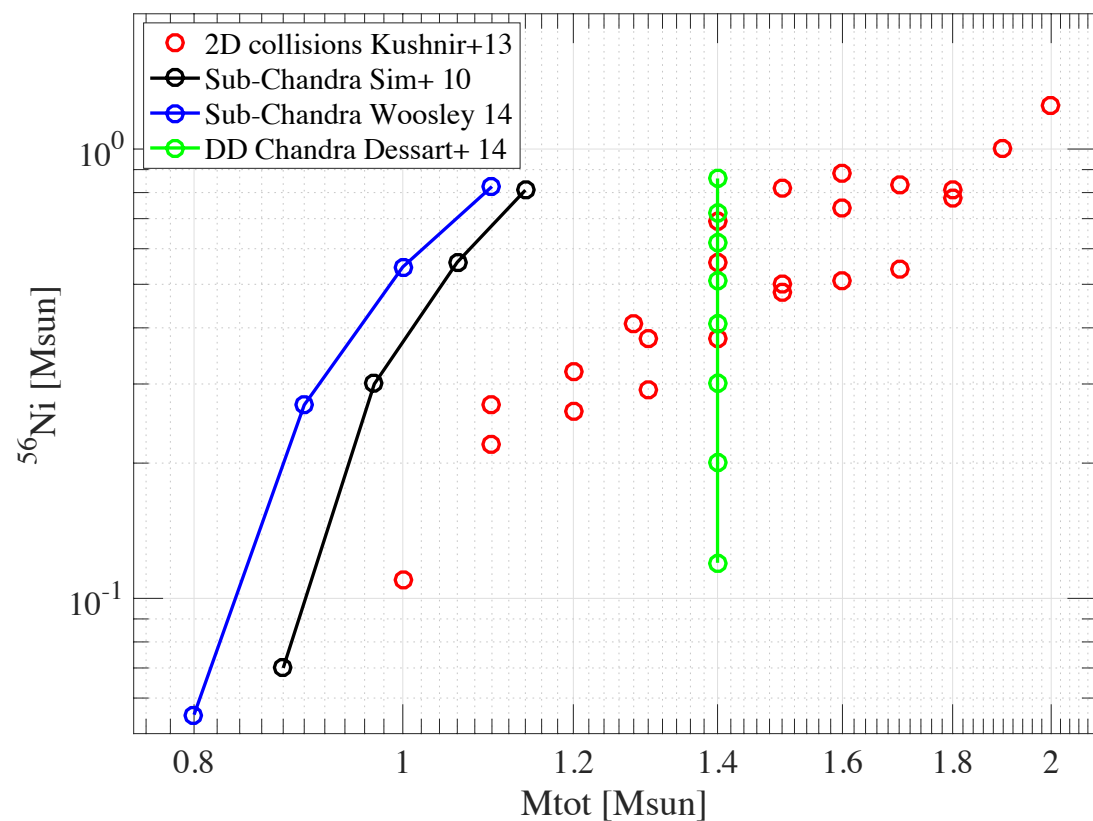


Column density is *not* the same as mass



Column density is *not* the same as mass

WTF? (= Why This Forms?)



Outline:

Energy conservation: $Q_{\text{dep}} \rightarrow L_{\text{uv}} \text{ or } L_{\text{air}}$

gamma escape
and benchmark:

$\langle \Sigma \rangle \rightarrow t_0 \quad Q_{\text{dep}}$

$$\bar{\tau} = \frac{\sum_i \int d^3v \rho_0(\vec{v}) \epsilon_i \oint \frac{d\Omega}{4\pi} \tau_i}{\sum_i \int d^3v \rho_0(\vec{v}) \epsilon_i}.$$

Jefferey 99

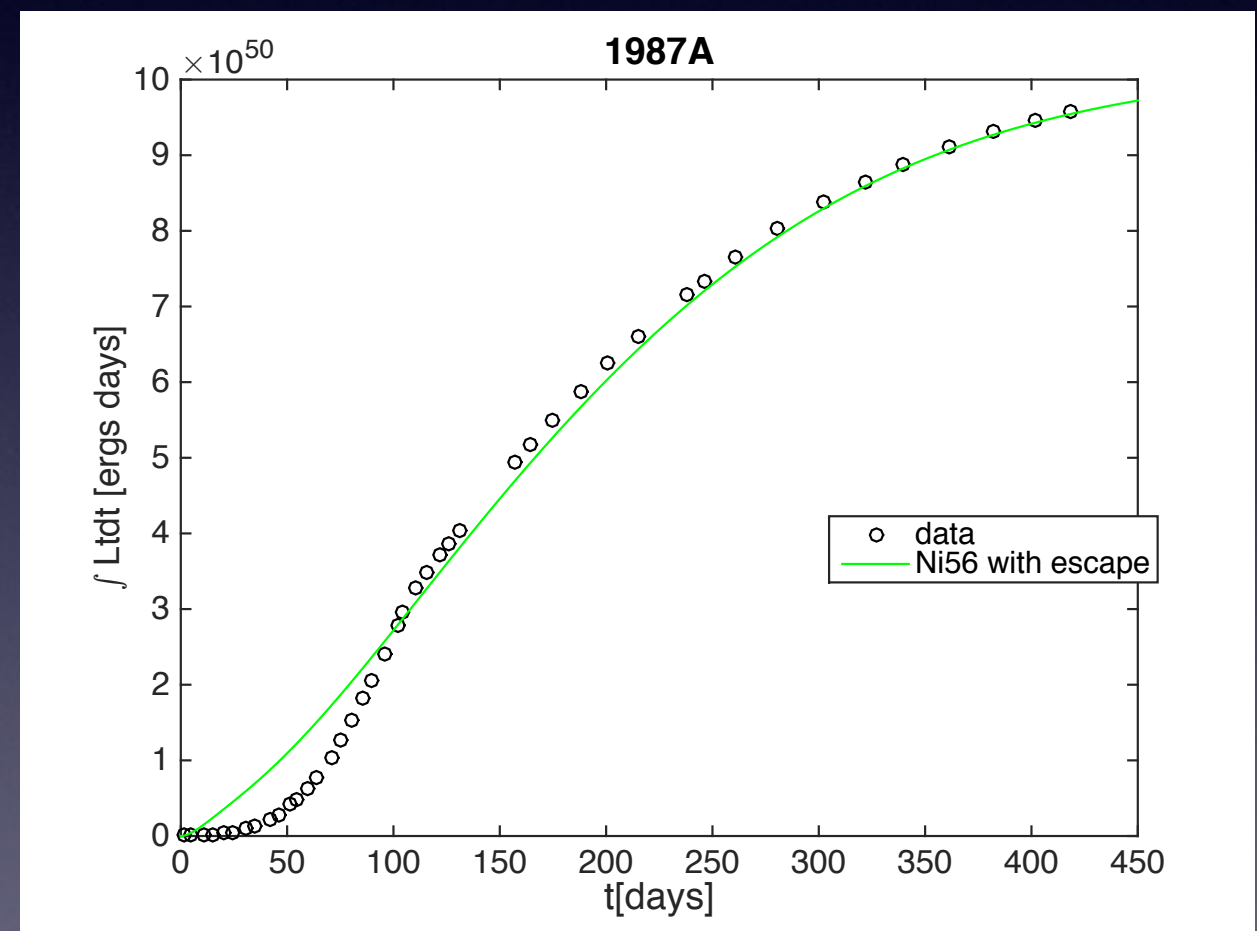
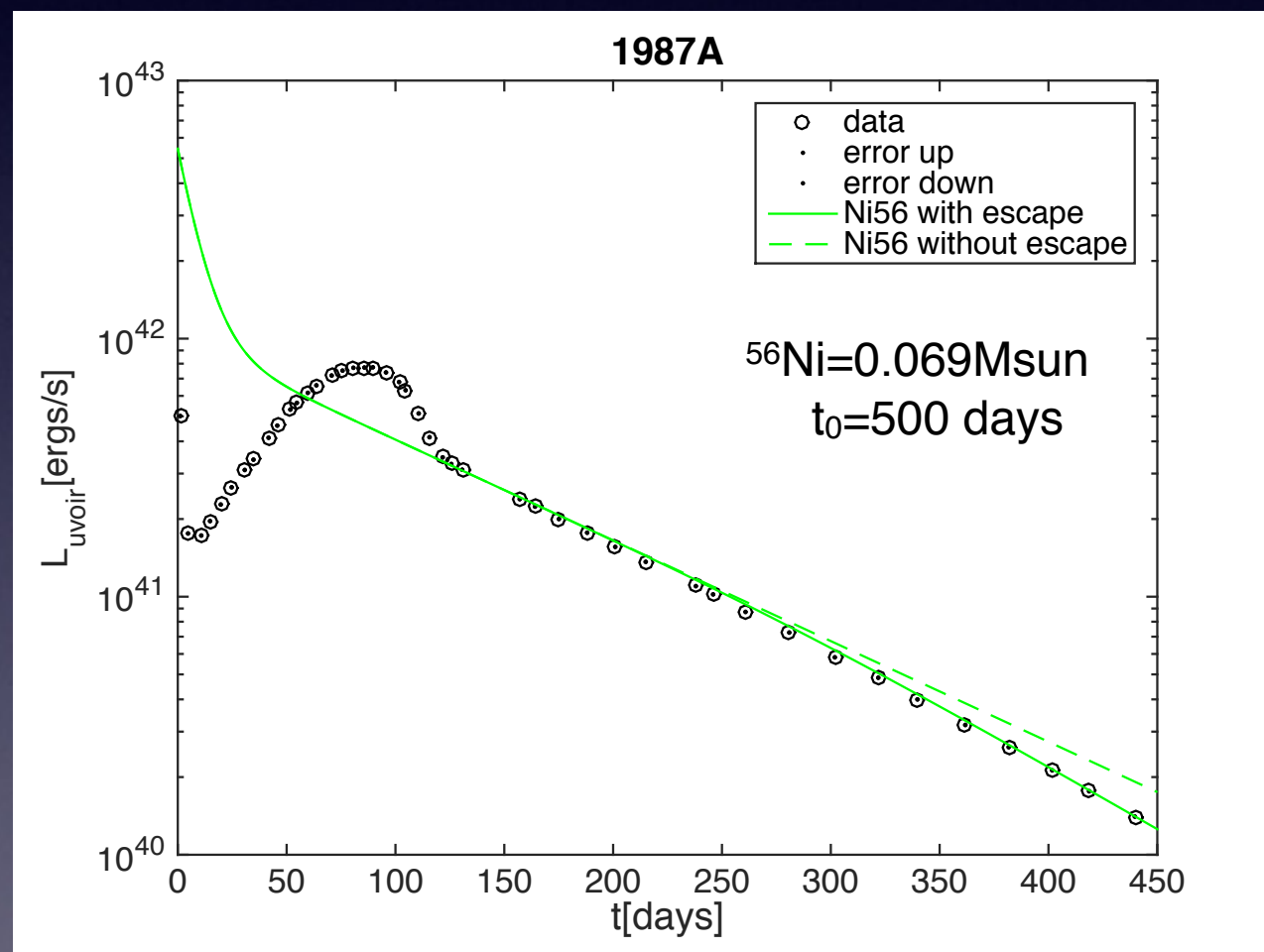
Why funny relation
to mass?

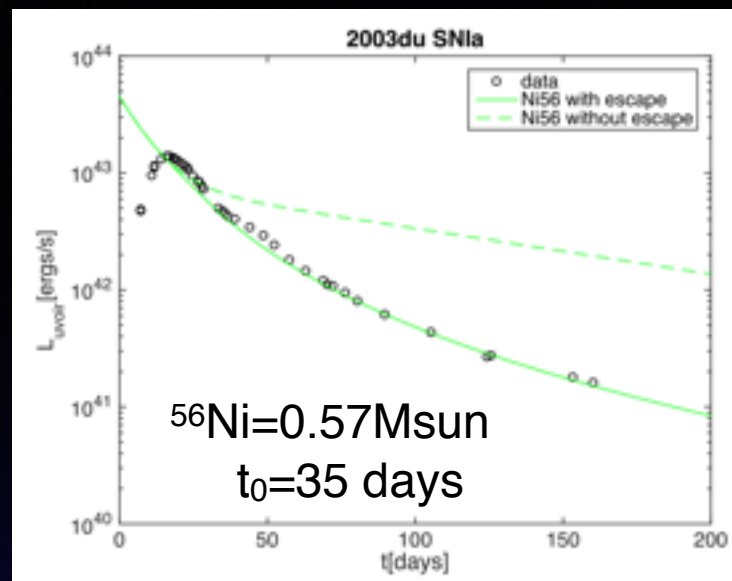
$M_{\text{tot}, {}^{56}\text{Ni}} \rightarrow \langle \Sigma \rangle$

a word on asymmetry

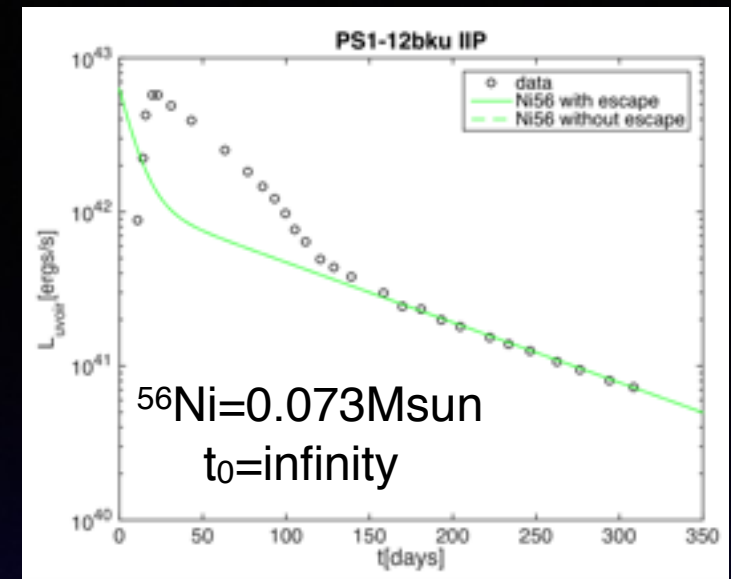
Real time analysis

Energy Conservation demonstration

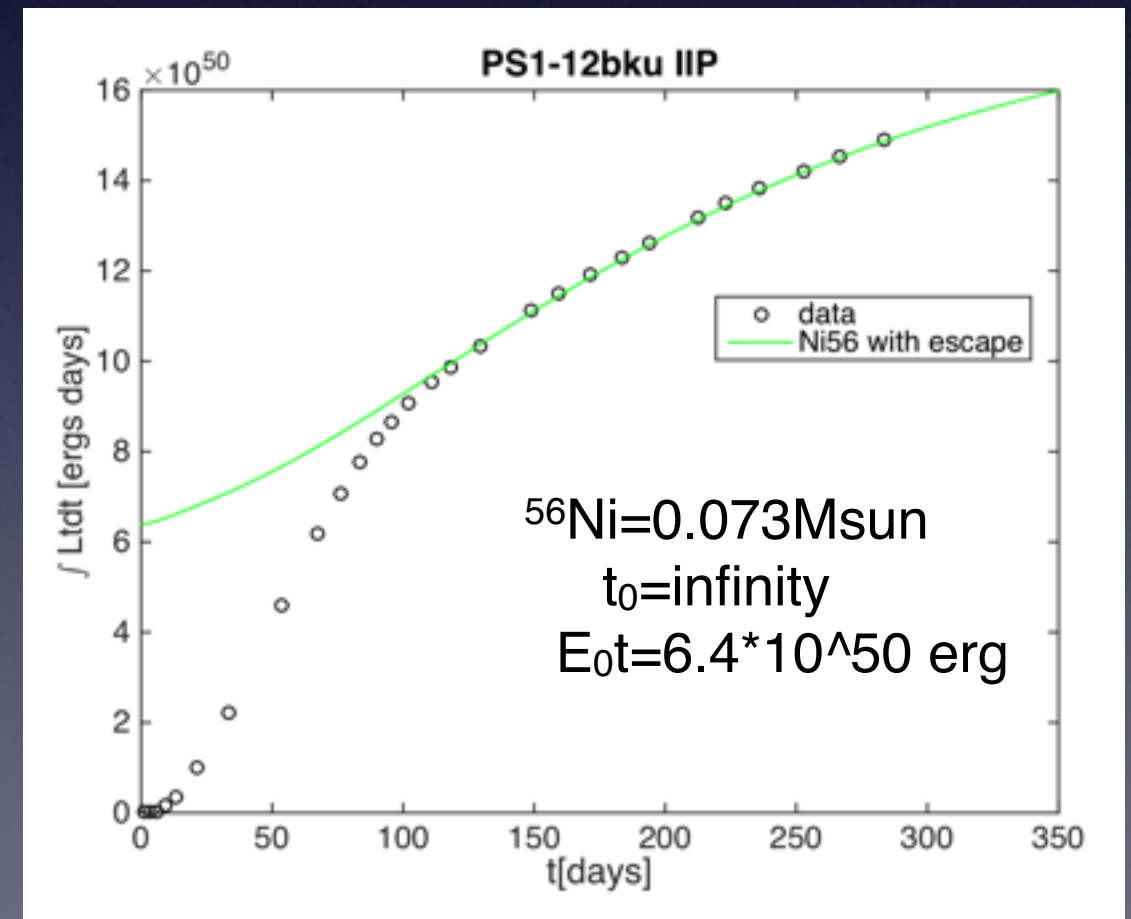
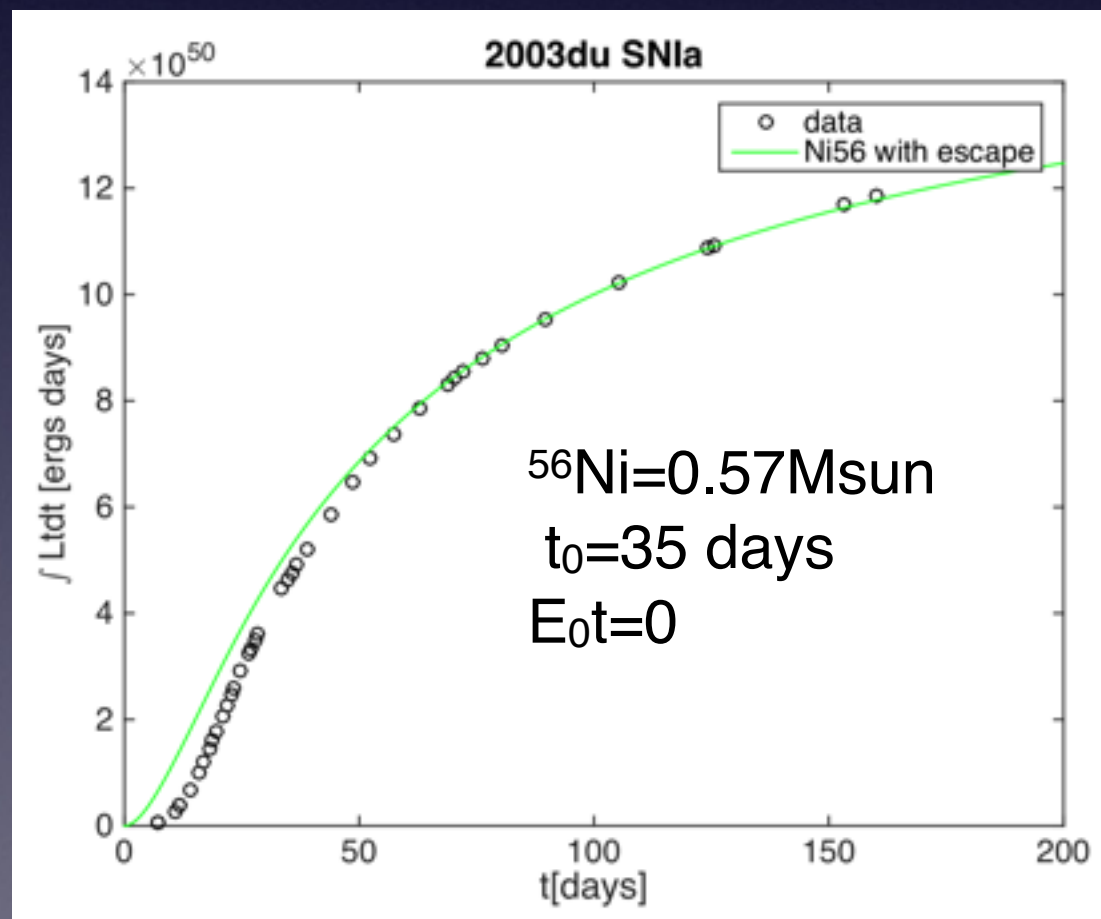




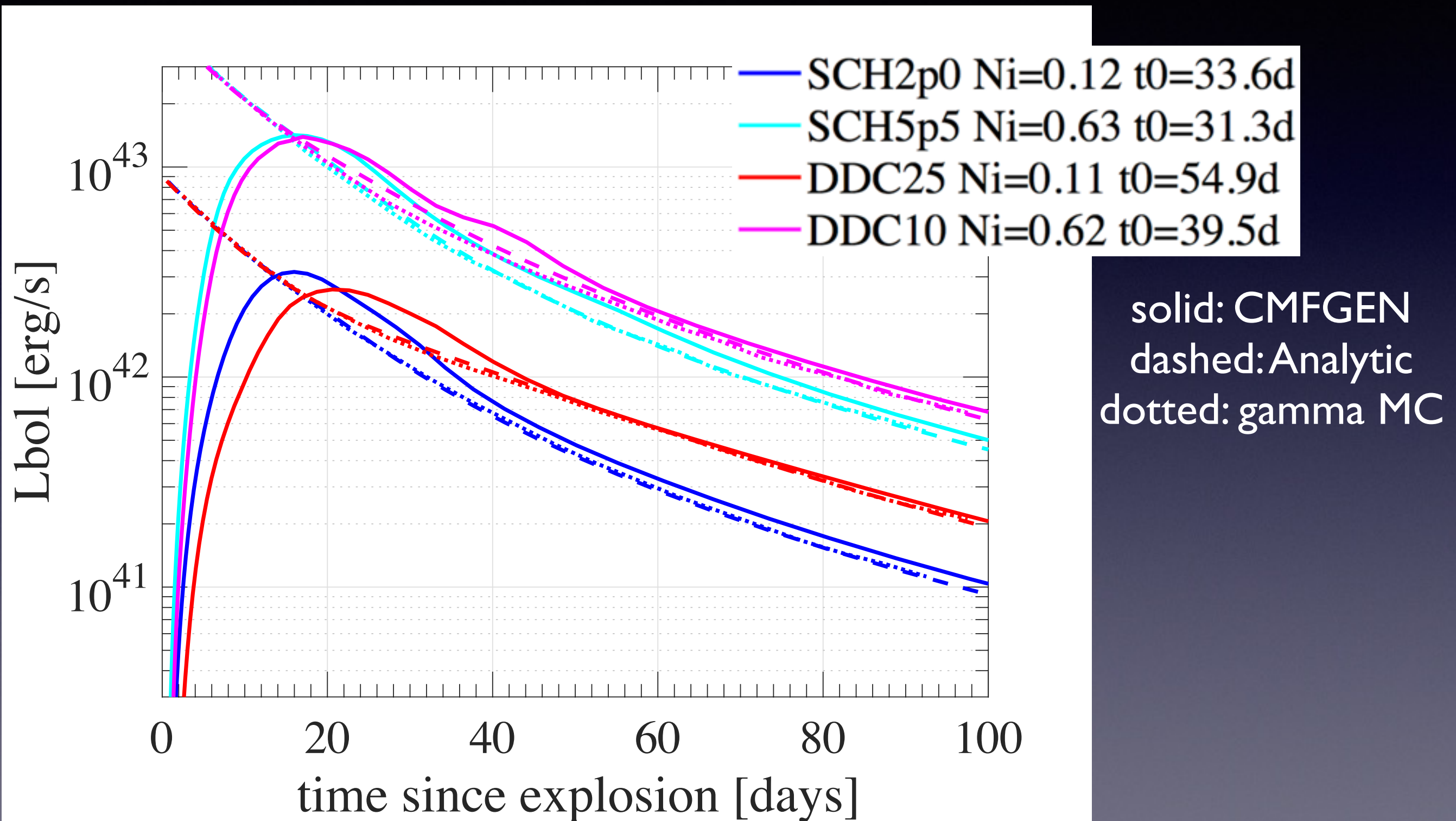
data from Stanishev+ 07



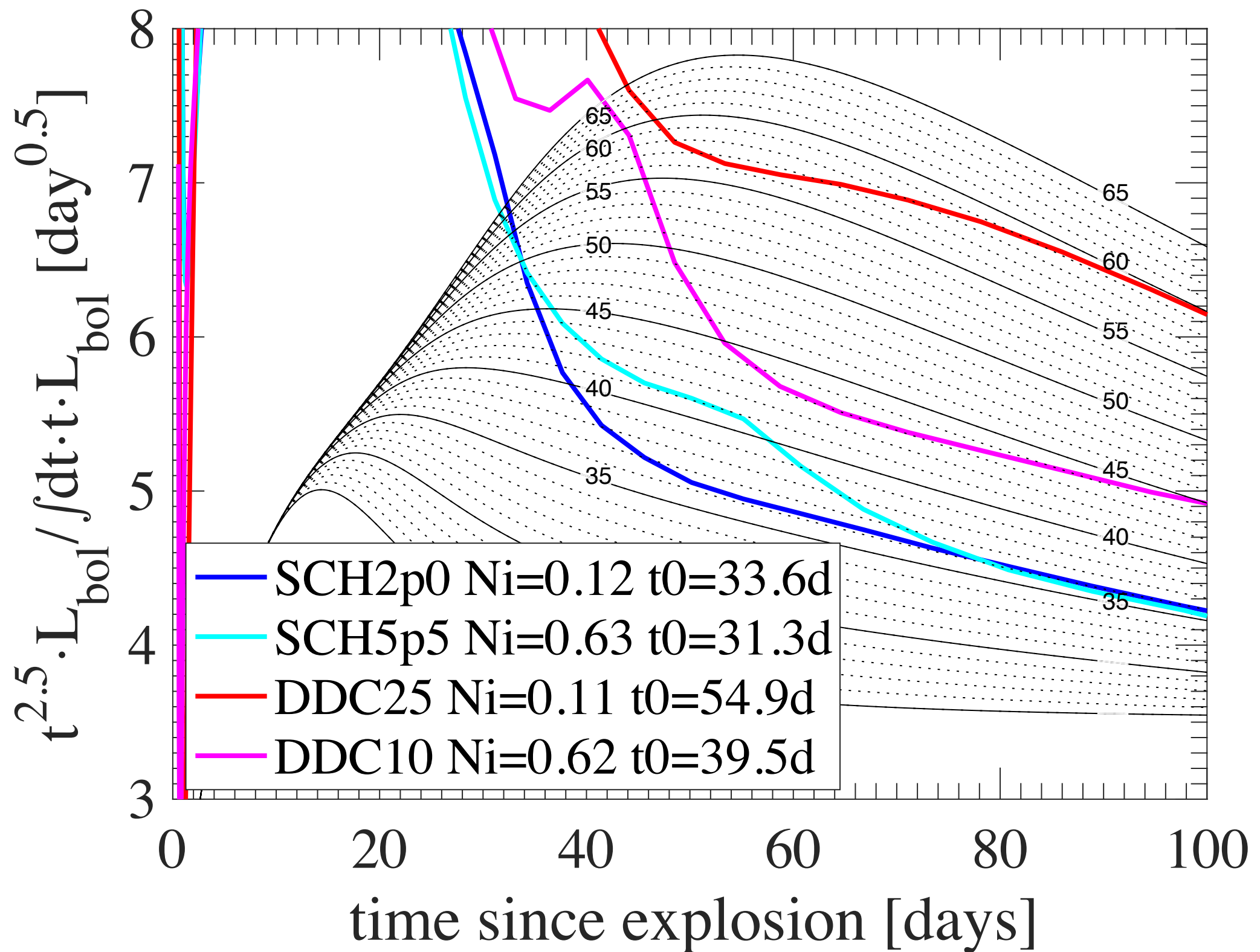
data from Sanders+ 14



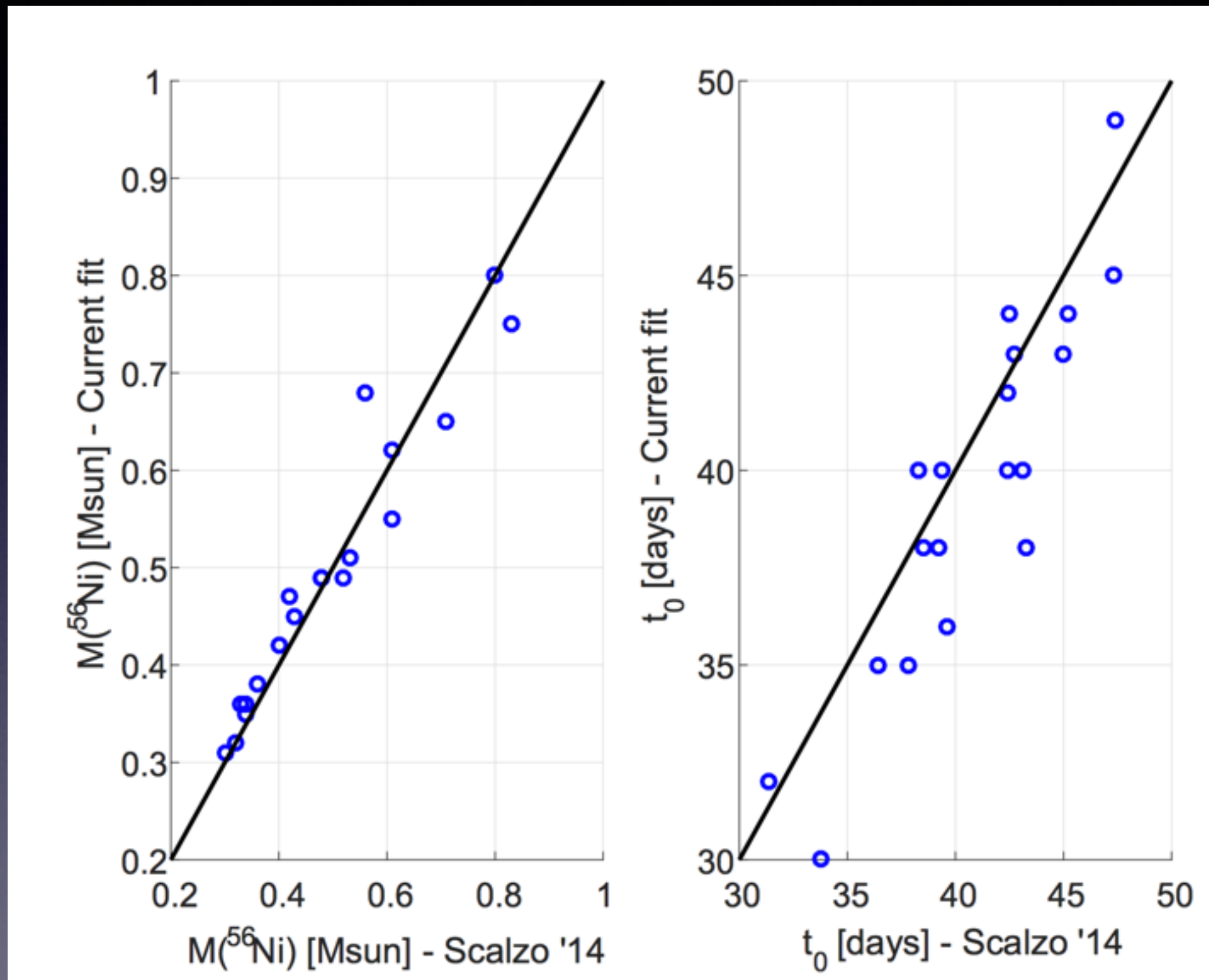
Analytic Qdep works



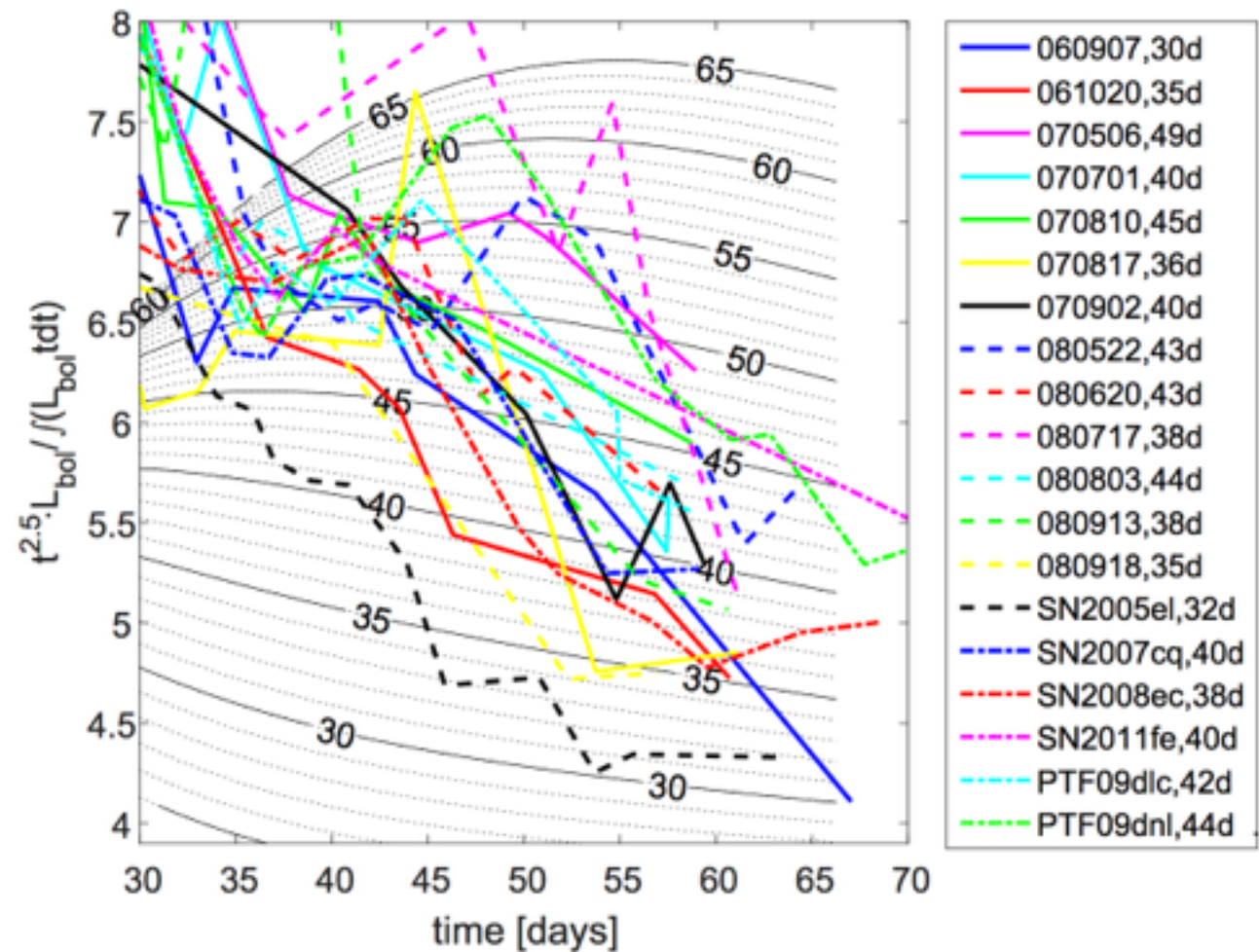
Analytic t0 works



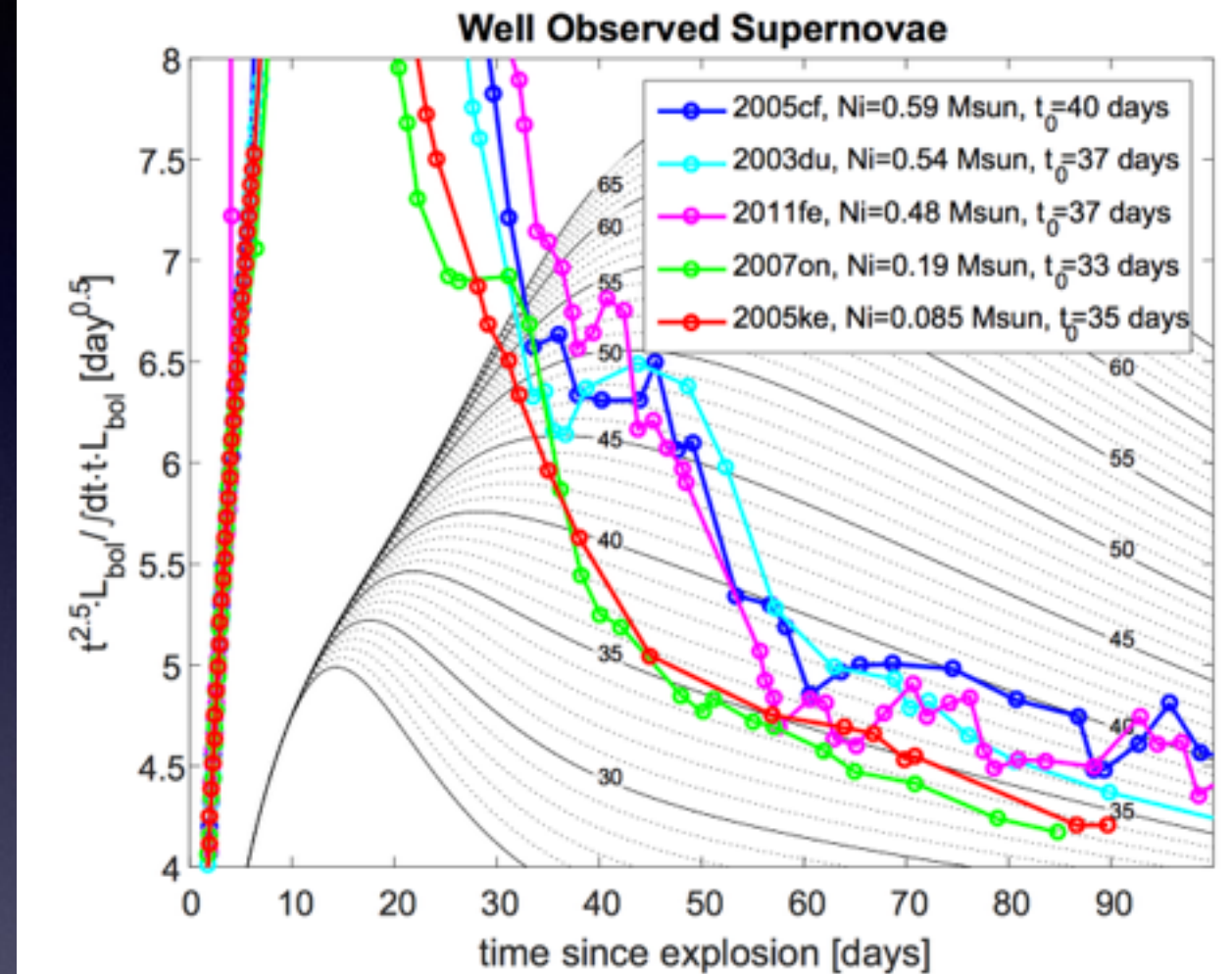
We agree with Scalzo 14+



But note the limited quality



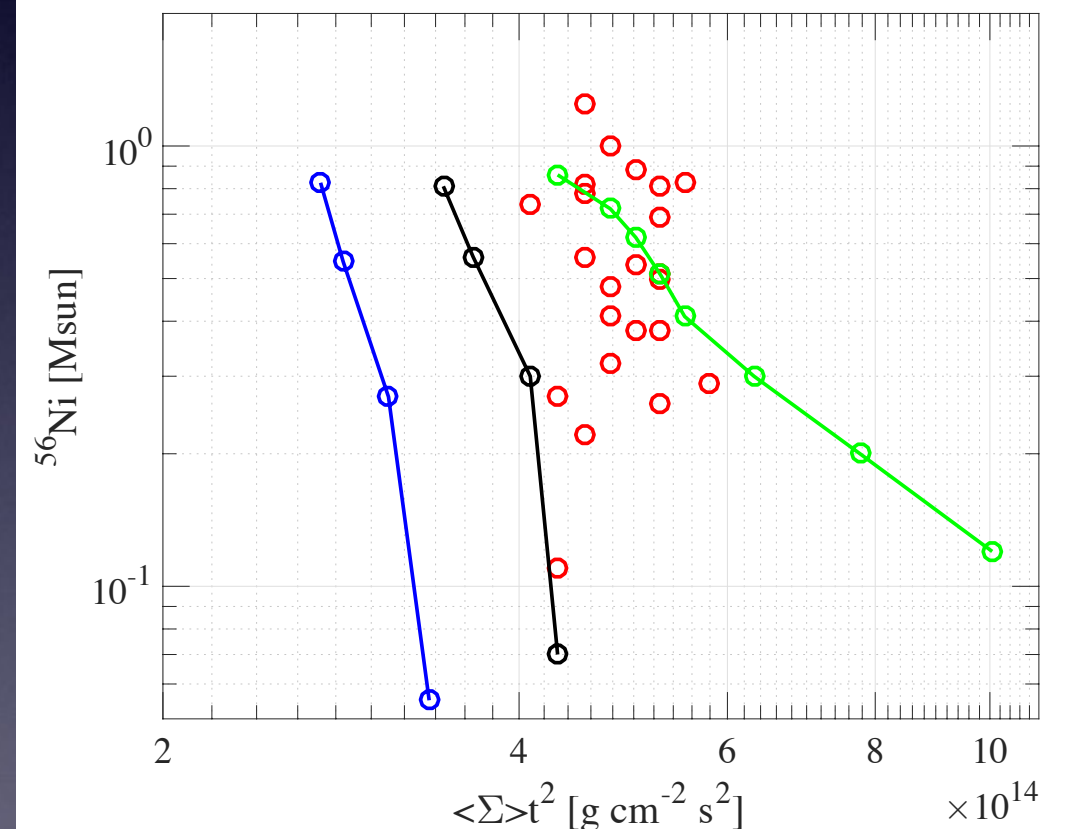
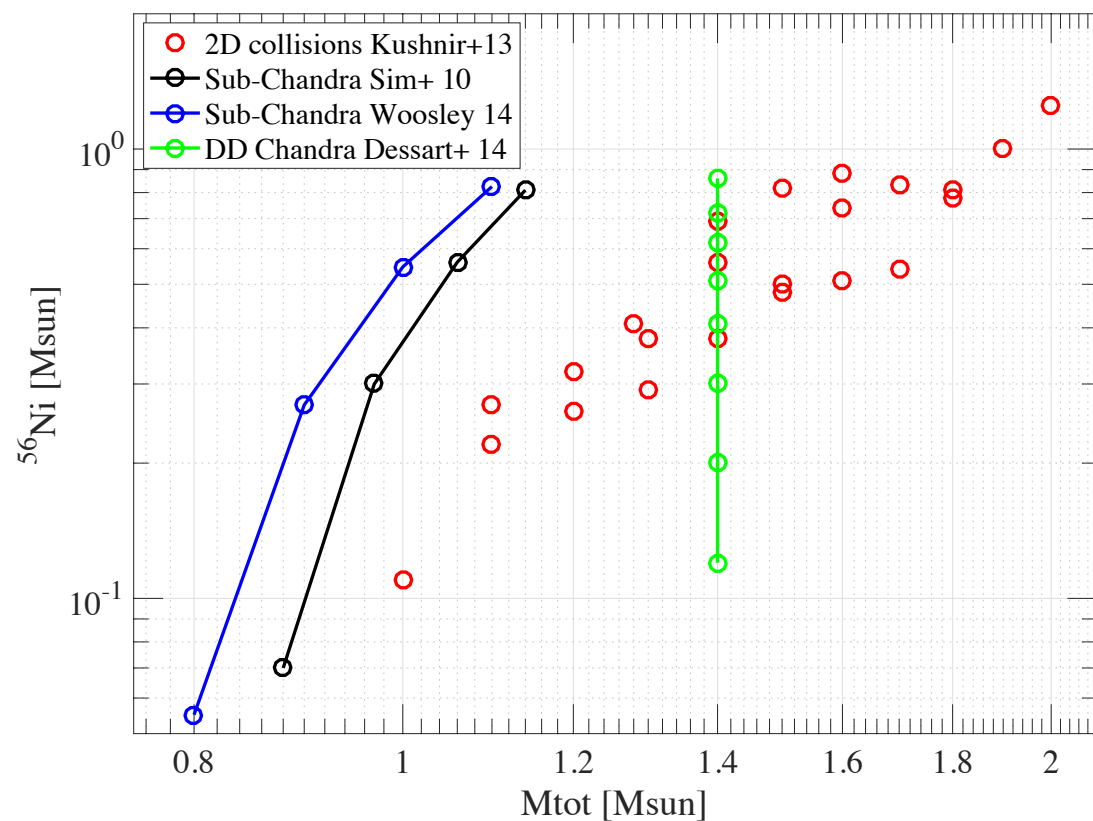
Scalzo + 14 sample



Wygoda + 17

Column density is *not* the same as mass

WTF? (= Why This Forms?)

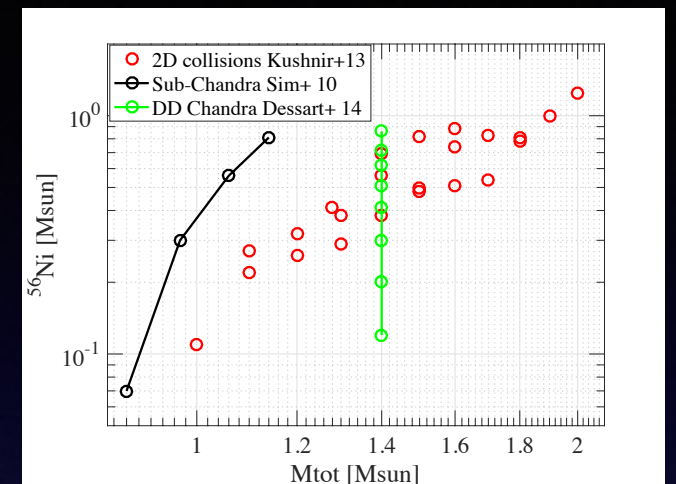
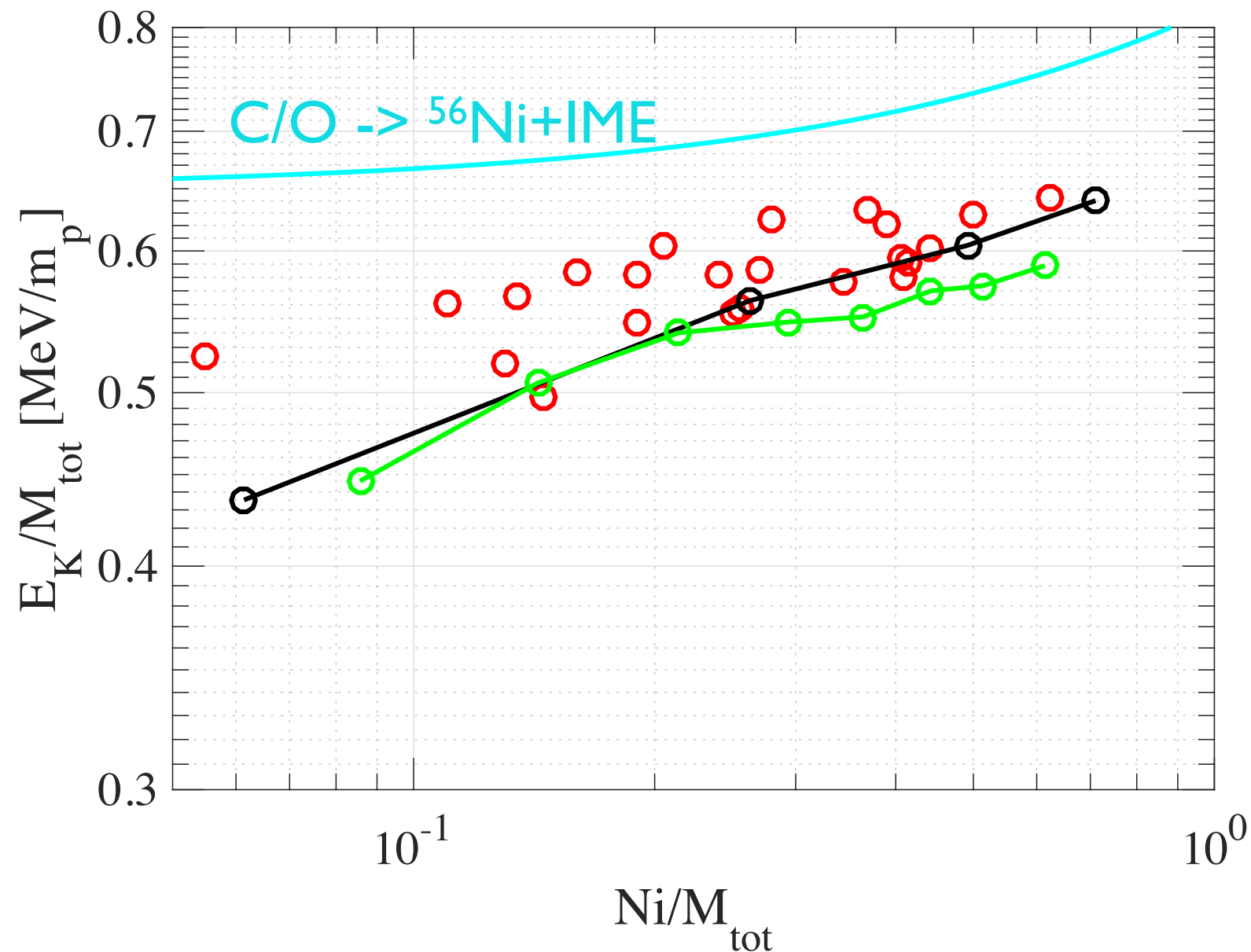


Column density is *not*
the same as mass

$$\langle \Sigma \rangle \propto f(v_{\text{Ni}}/v) \times \frac{M}{v^2}$$

Factor ~ 1.3 energy yield

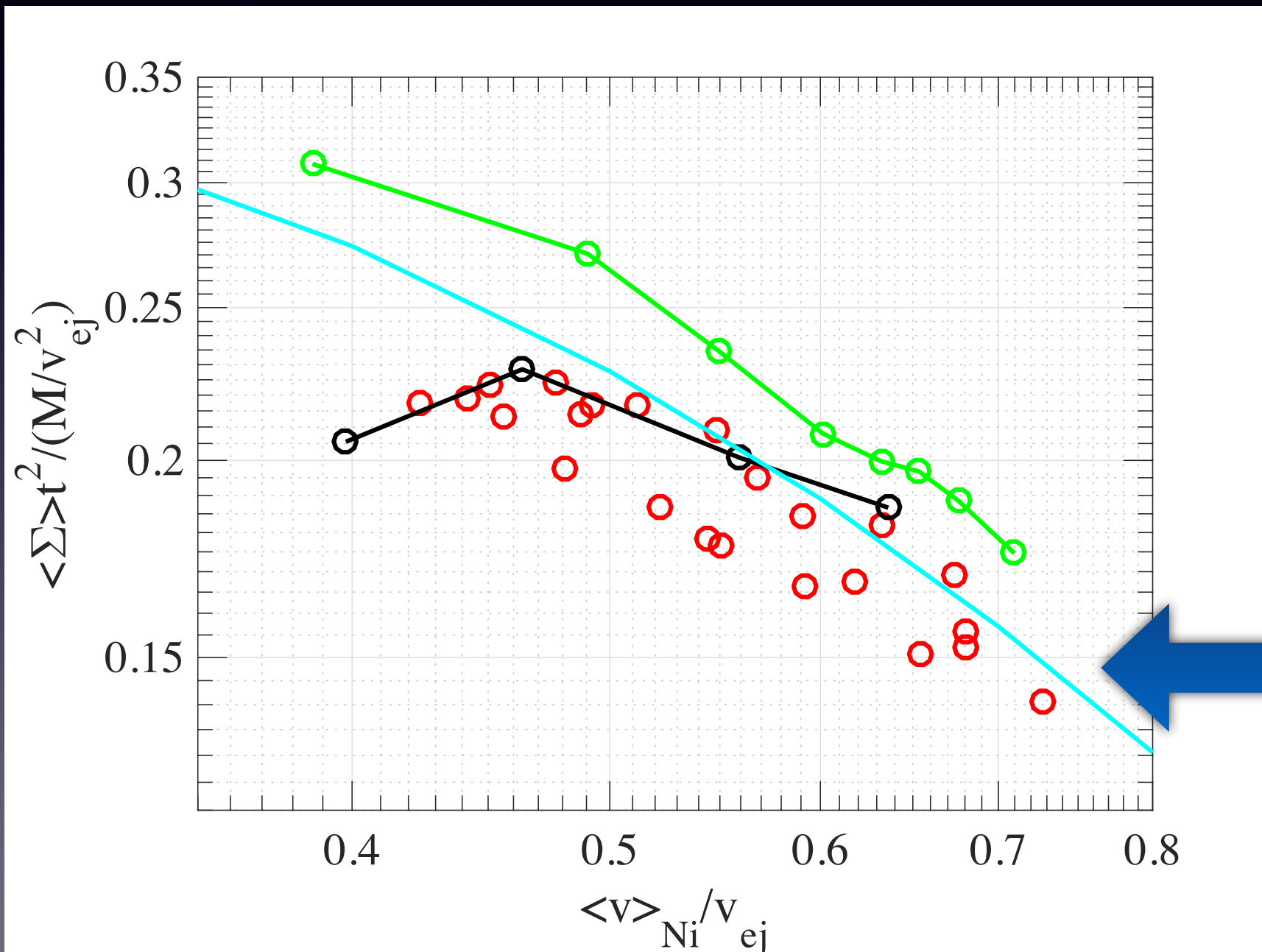
$$\langle \Sigma \rangle \propto f(v_{\text{Ni}}/v) \times \frac{M}{v^2}$$



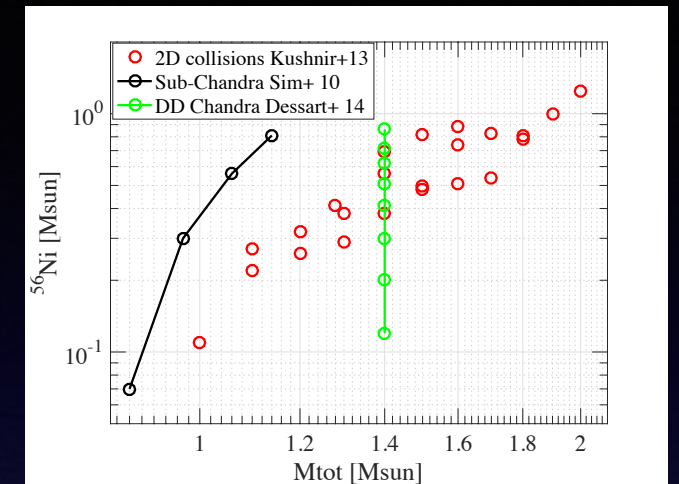
- 2D collisions Kushnir+13
- Sub-Chandra Sim+ 10
- DD Chandra Dessart+ 14

Factor ~ 1.5 due to Ni position

$$\langle \Sigma \rangle \propto f(v_{\text{Ni}}/v) \times \frac{M}{v^2}$$



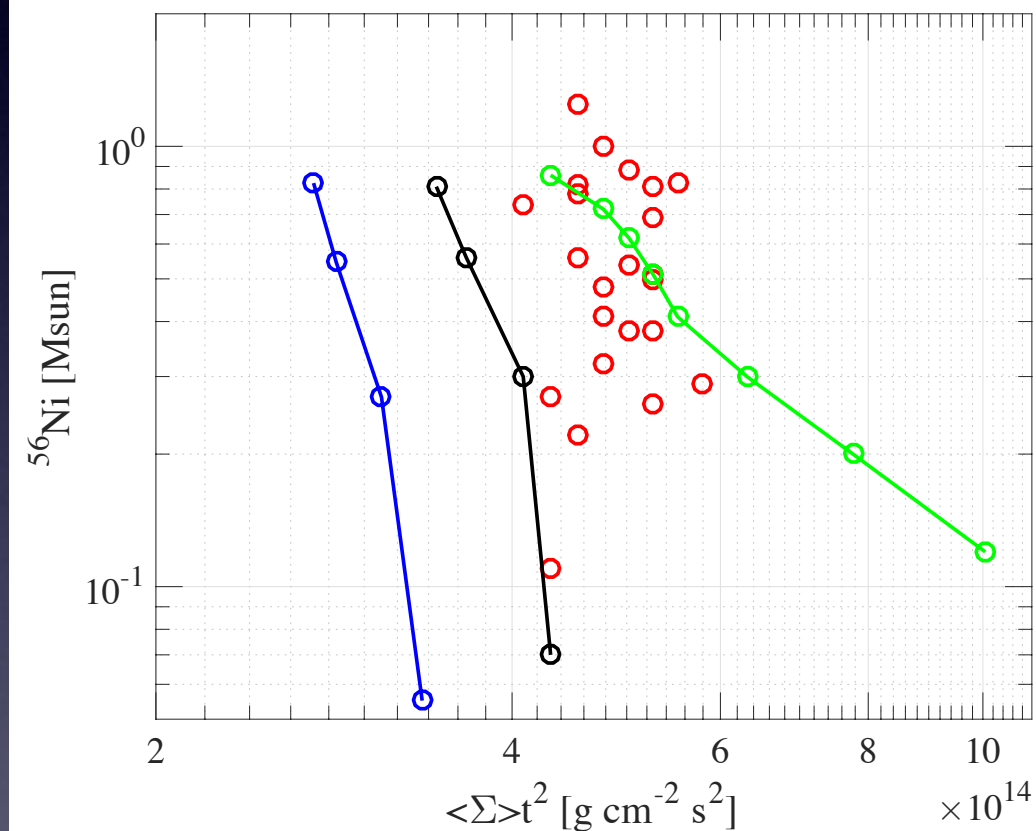
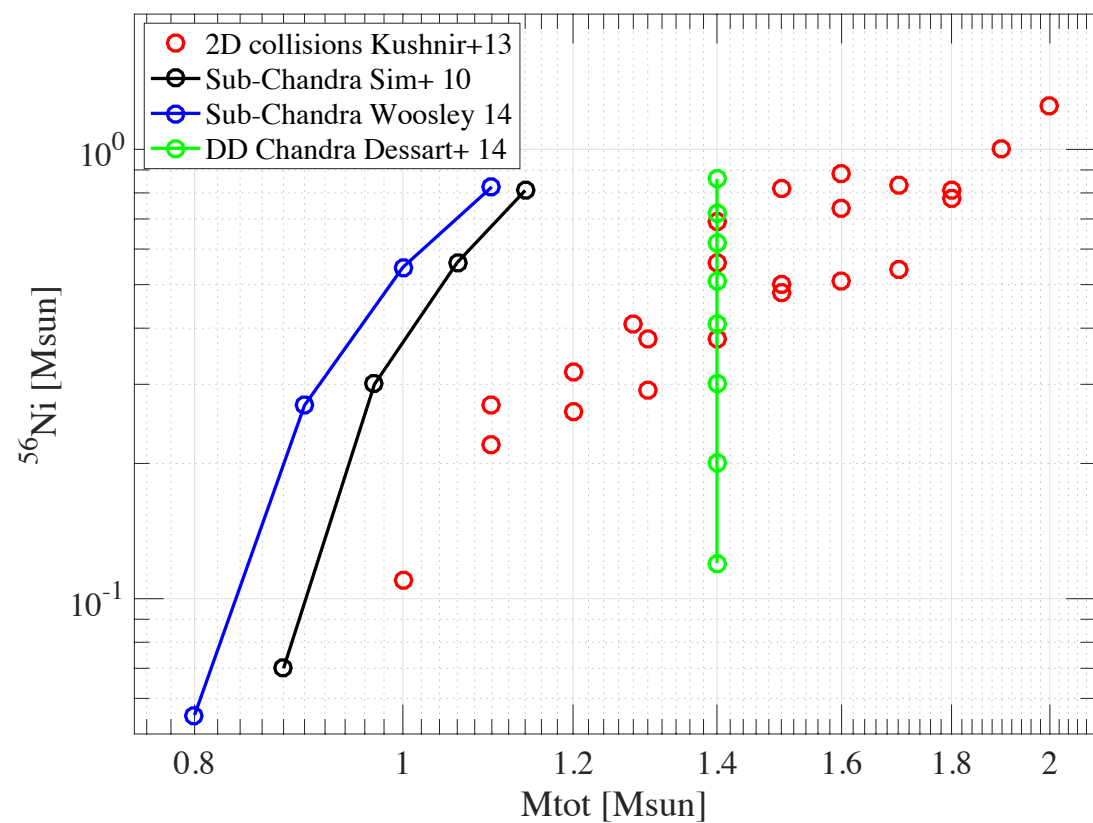
^{56}Ni



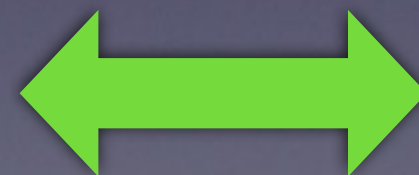
- 2D collisions Kushnir+13
- Sub-Chandra Sim+ 10
- DD Chandra Dessart+ 14

Exponential profile
Ni at single velocity

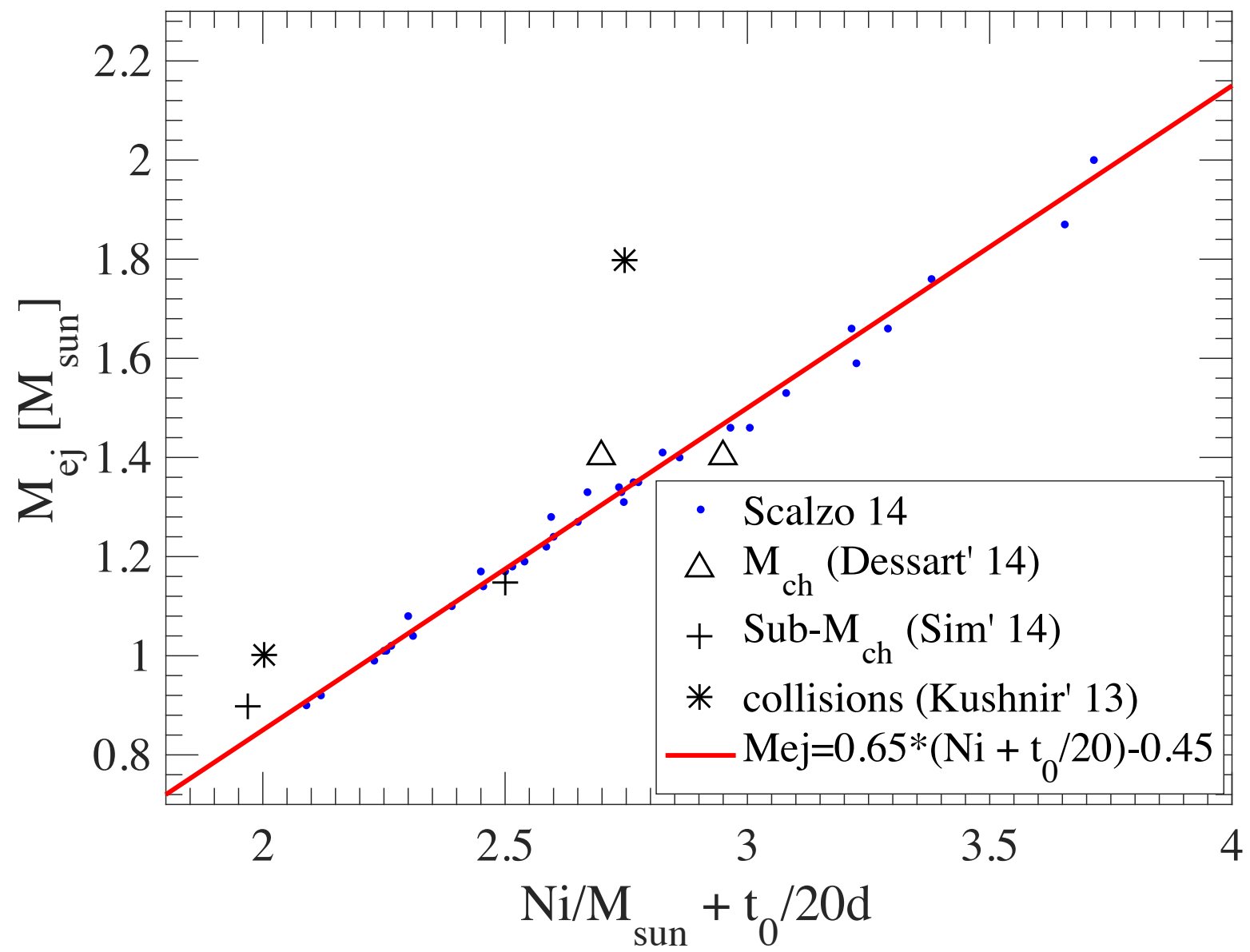
$$1.3 \times 1.5 = 2$$



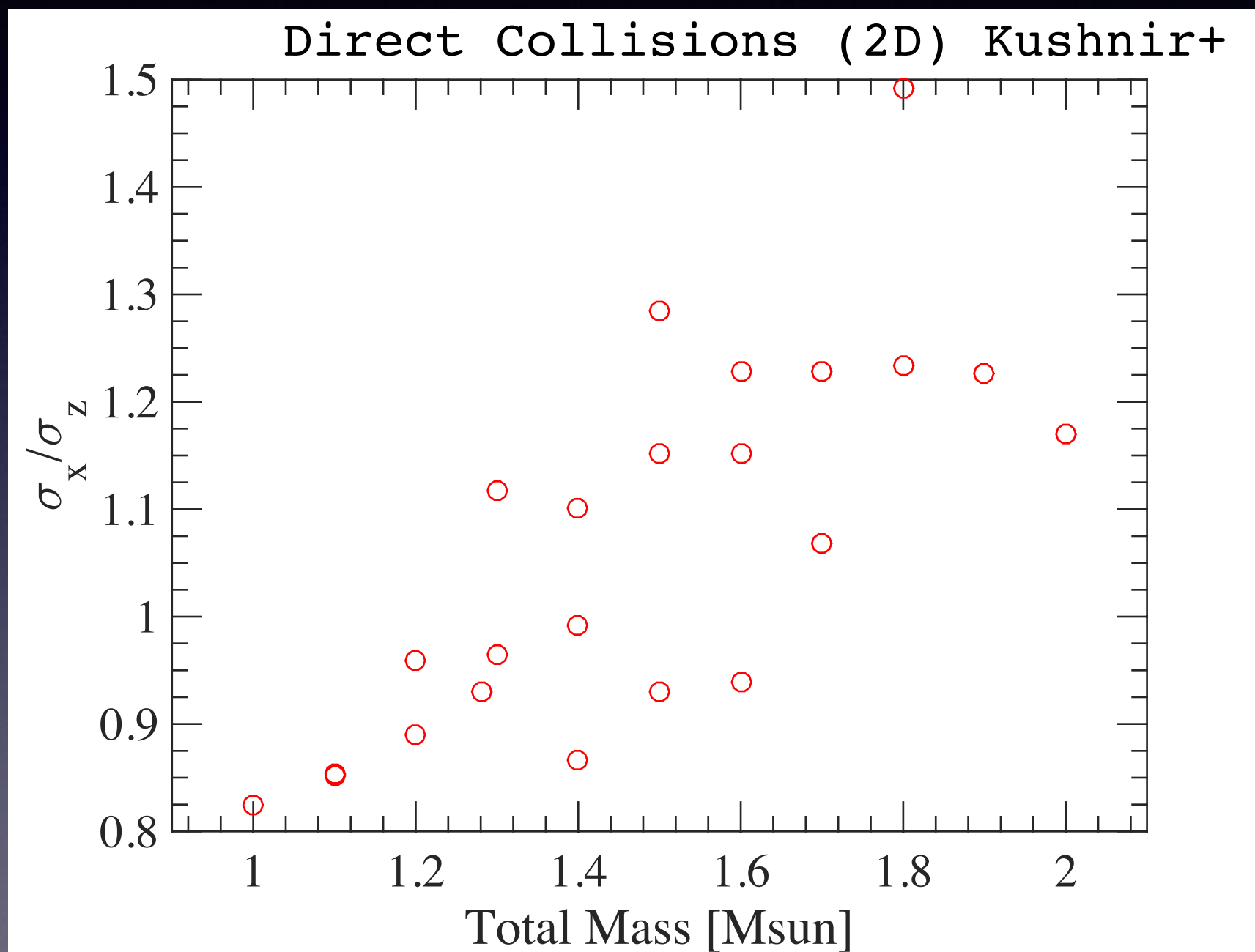
2

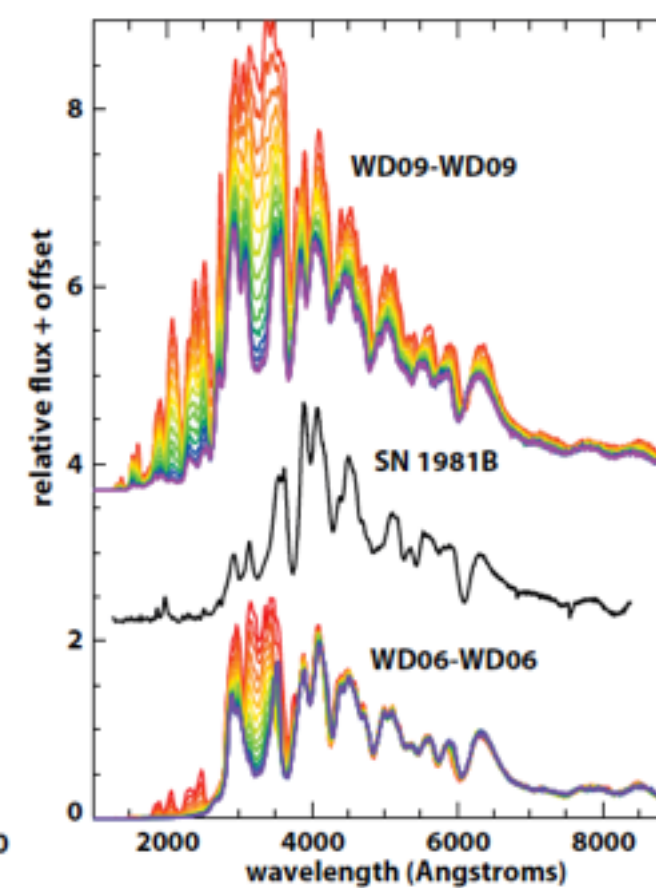
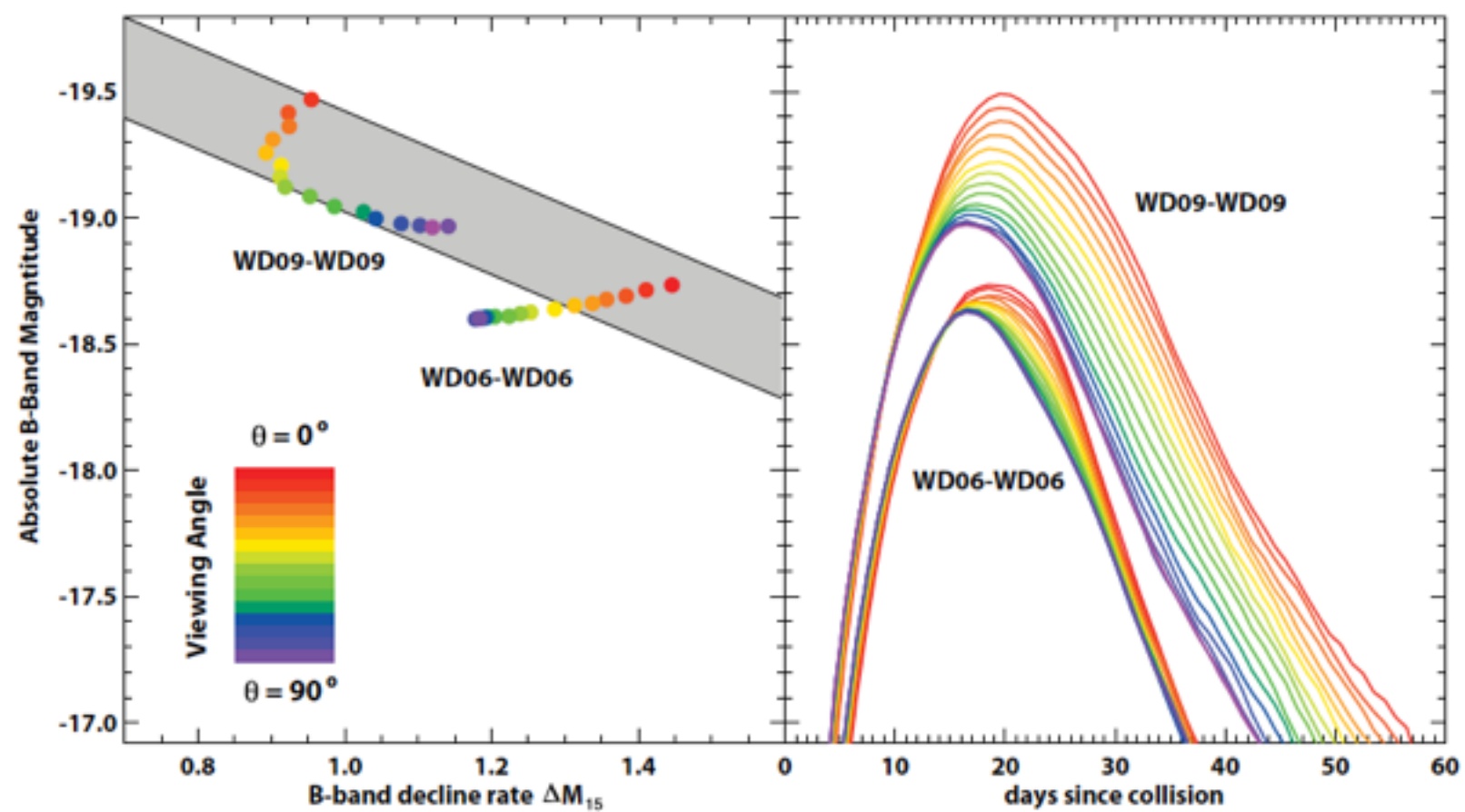
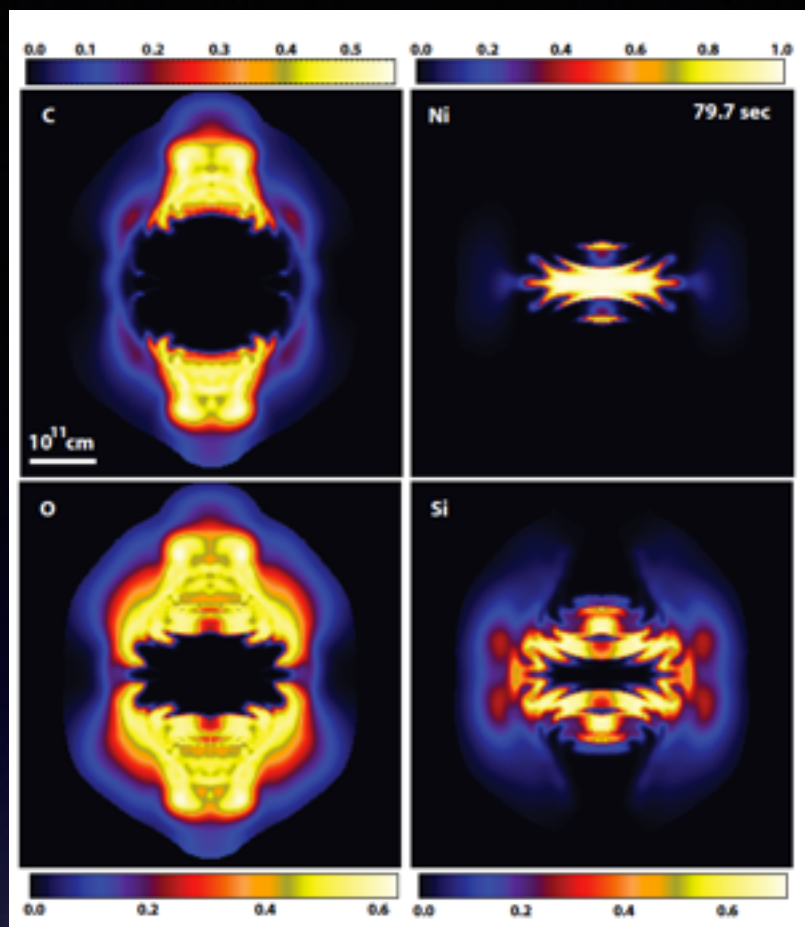


2

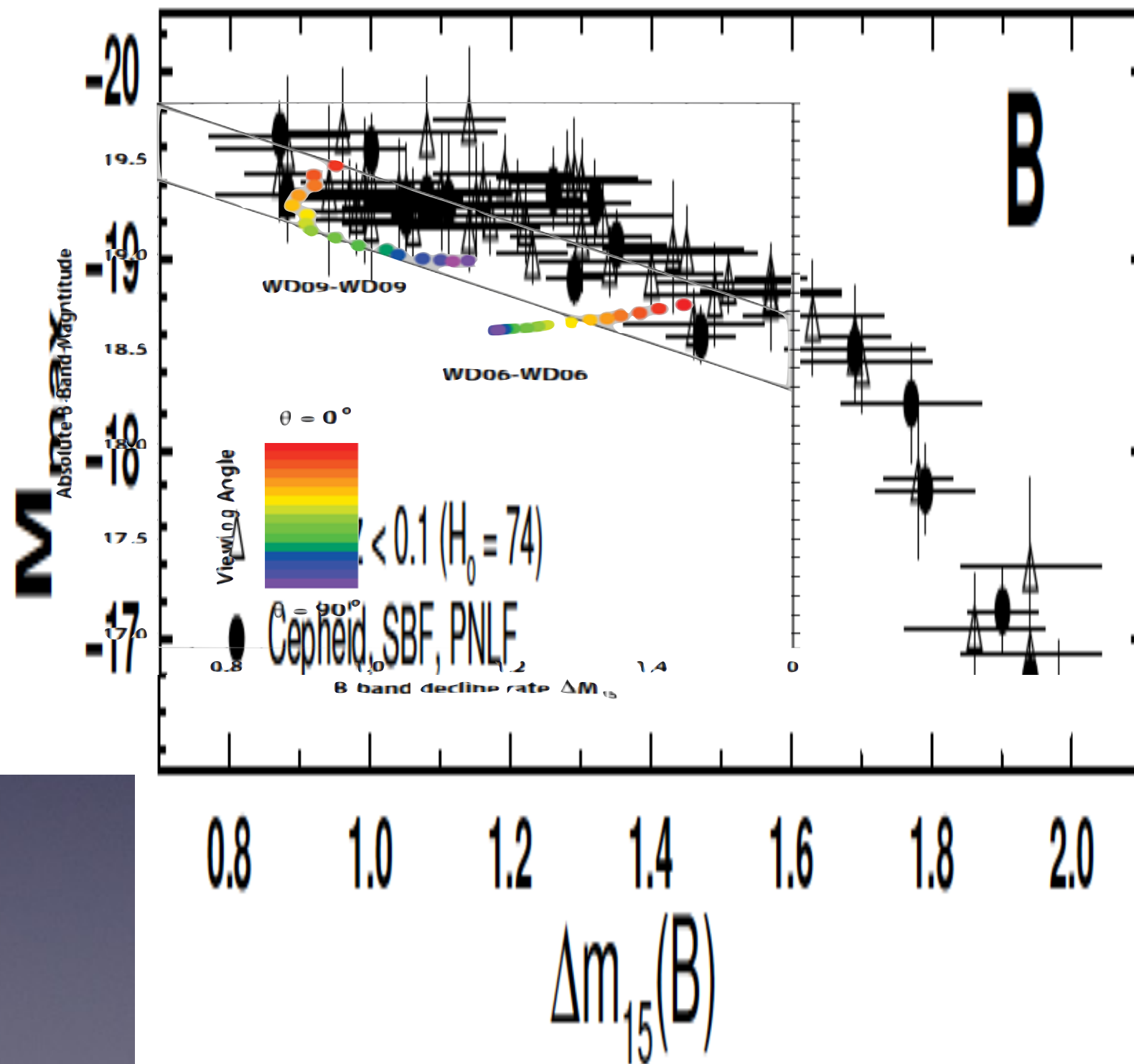


Something about asymmetry





Rosswog +09



Rosswog +09

Code in this presentation is here:

<https://goo.gl/mHQAEd>



letter **l** as in 'google'