Modelling uncertainty of the Rhenium-Osmium cosmic clock

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Svein Rosselands hus 209

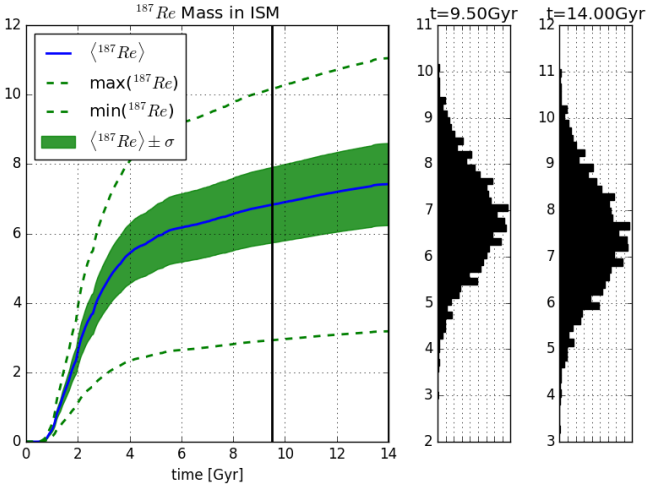
Intro

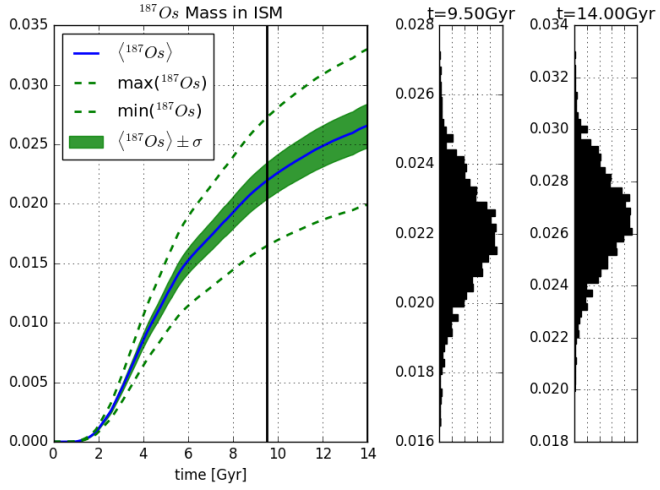
Results

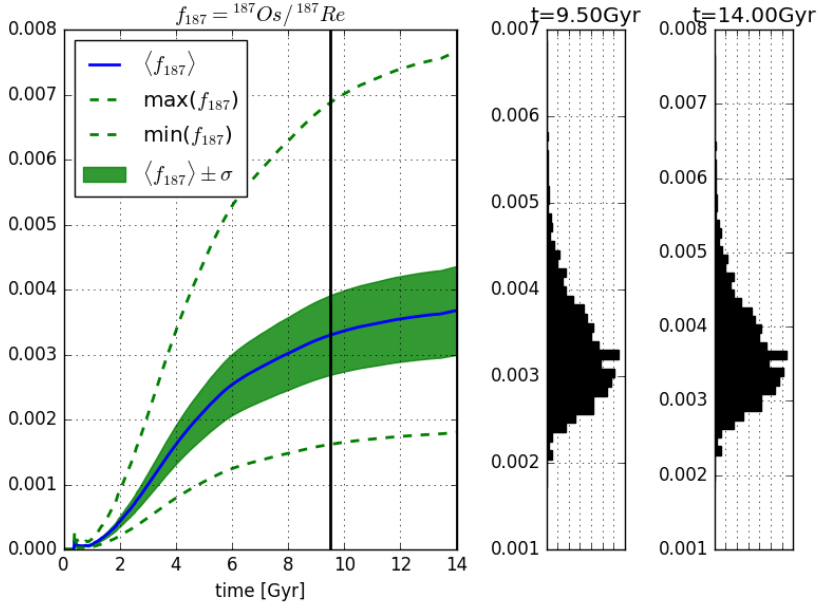
- $^{187}_{75}\mathrm{Re}$ in interstellar gas
- $^{187}_{76}\mathrm{Os}$ in interstellar gas
- $\mathrm{f}_{187} = \frac{^{187}_{76}\mathrm{Os}}{^{187}_{75}\mathrm{Re}}$
- Rate of neutron star mergers

- **Yields**
- **Yields+IMFslope**
- **Yields+IMFslope+NSM**

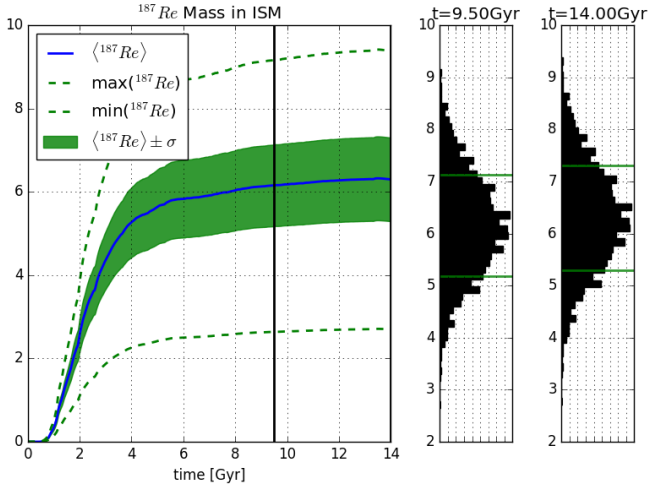
Yields without postprocessing

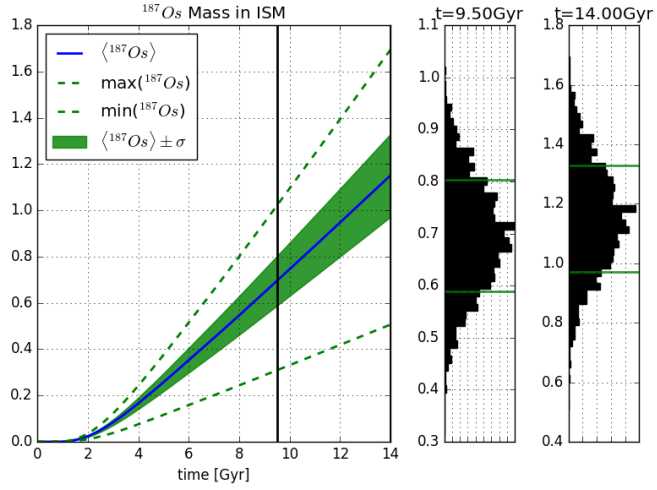


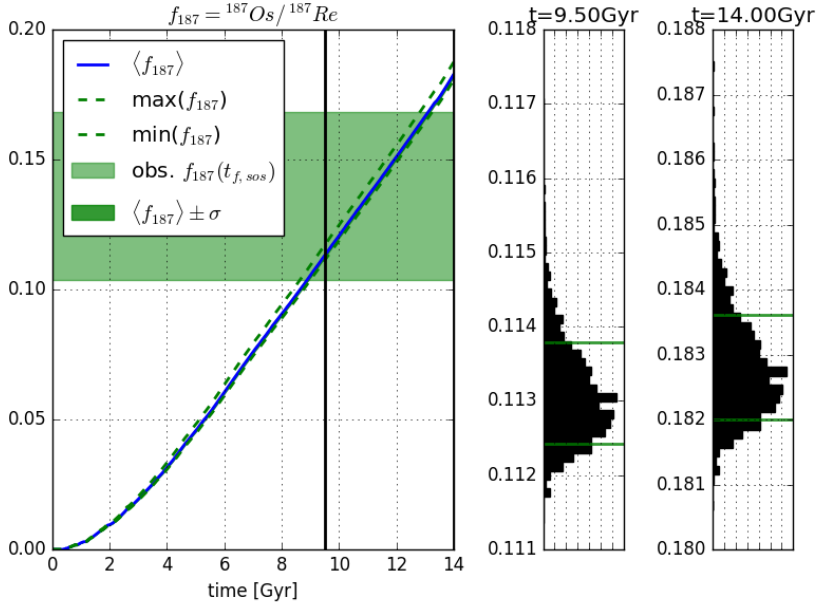




Yields with postprocessing



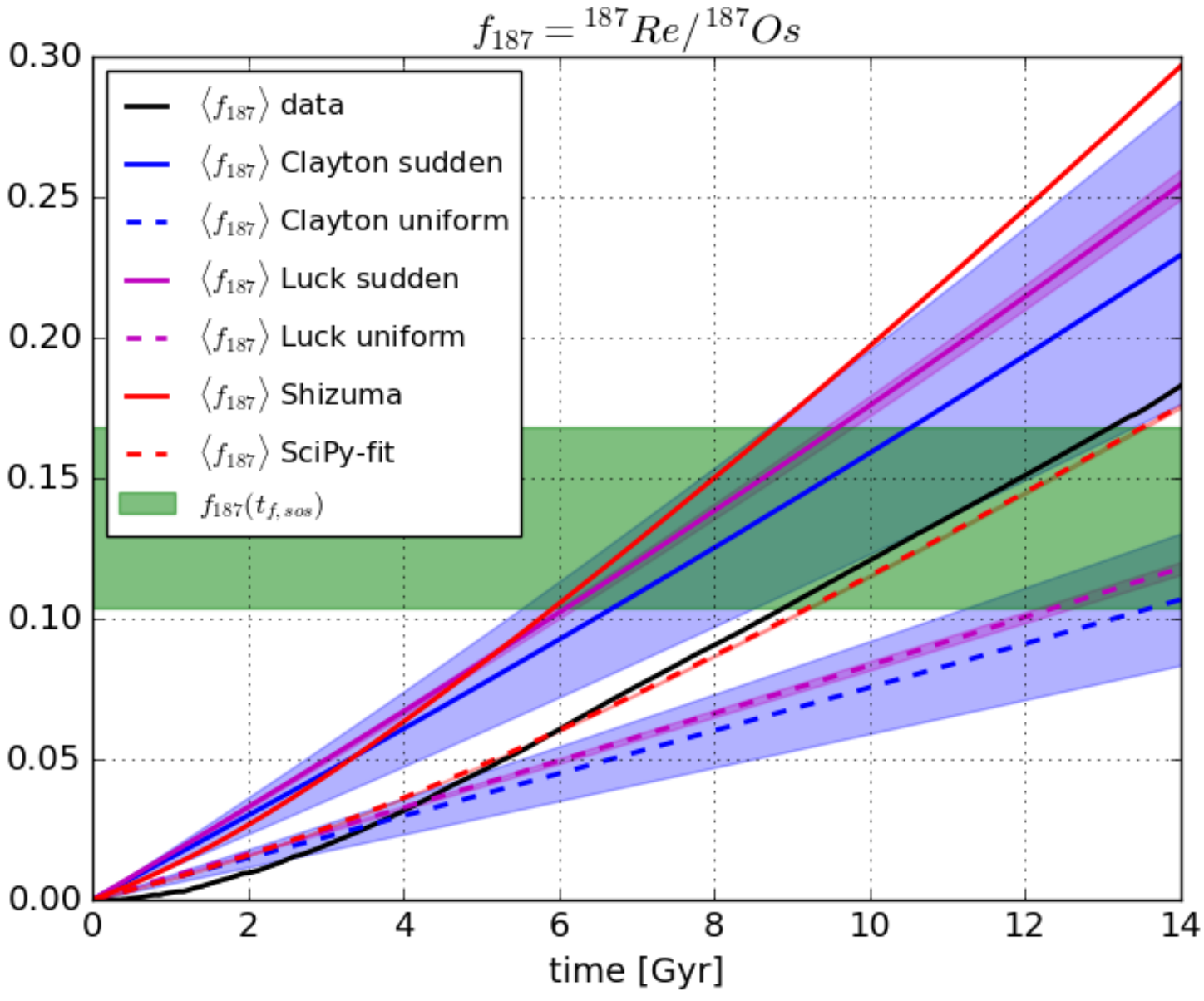




Comparing models

Model	$^{187}_{76}\mathrm{Os}_c/\,^{187}_{75}\mathrm{Re}$	λ_{Re}	λ_{rncp}
Clayton	$\frac{\Lambda-\lambda}{\lambda}e^{\lambda t}\frac{1-e^{-\Lambda t}}{1-e^{-(\Lambda-\lambda)t}}-1$	$\lambda=\frac{\ln 2}{\tau_{Re}}$	Λ
Clayton Sudden synthesis	$e^{\lambda t}-1$	$\tau_{Re}=47\pm 10Gyr$	$\Lambda\to\infty$
Clayton Uniform synthesis	$\frac{\lambda t}{1-e^{-\lambda t}}-1$	———"———	$\Lambda\to 0$
Luck	$\frac{\lambda_{Re}/\beta(1-e^{-\beta t})-(1-e^{-\lambda_{Re}t})}{e^{-\beta t}-e^{-\lambda_{Re}t}}$	$\lambda_{\mathrm{Re}}=\begin{array}{c}1.62\pm 0.08\\ \times 10^{-11}yr^{-1}\end{array}$	β
Luck Sudden synthesis	———"———	———"———	$\beta=10^{-6}yr^{-1}$
Luck Steady state	———"———	———"———	$\beta=10^{-12}yr^{-1}$
Shizuma	$\frac{(1-e^{-\lambda_\beta^{\mathrm{eff}}t})-(1-e^{-\lambda t})\lambda_\beta^{\mathrm{eff}}/\lambda}{e^{-\lambda_\beta^{\mathrm{eff}}t}-e^{-\lambda t}}$	$\lambda_\beta^{\mathrm{eff}}=\frac{1.2\ln 2}{\tau_{Re}}=2.00\times 10^{-11}[yr^{-1}]$	$\lambda\in[0,2]Gyr^{-1}$
SciPy curvefit to *Fiducial Omega-model*-data	———"———	$\begin{array}{c}1.33\times 10^{-11}\\ \pm 2.767\times 10^{-14}\end{array}\ [yr^{-1}]$	$\begin{array}{c}5.42\times 10^{-10}\\ \pm 5.79\times 10^{-12}\end{array}\ [yr^{-1}]$

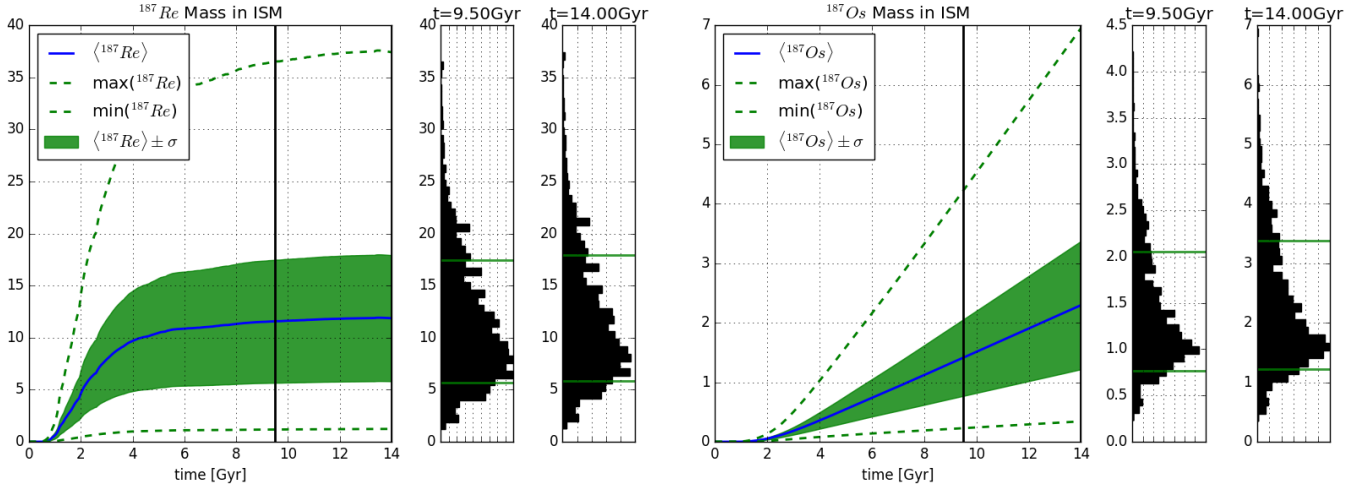
Comparing models

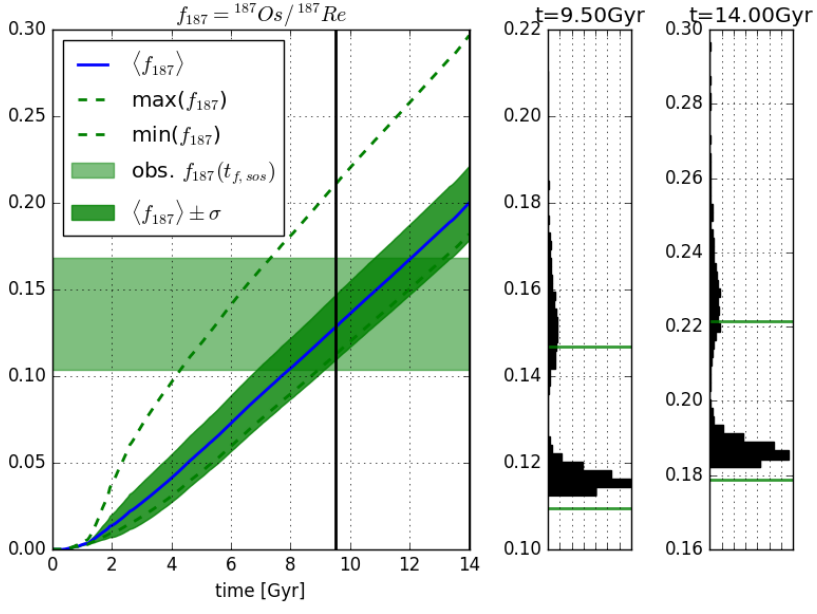


Comparing models

TODO! insert new plot of nsm-rates here

Uncertainties of **Yields+IMFslope**

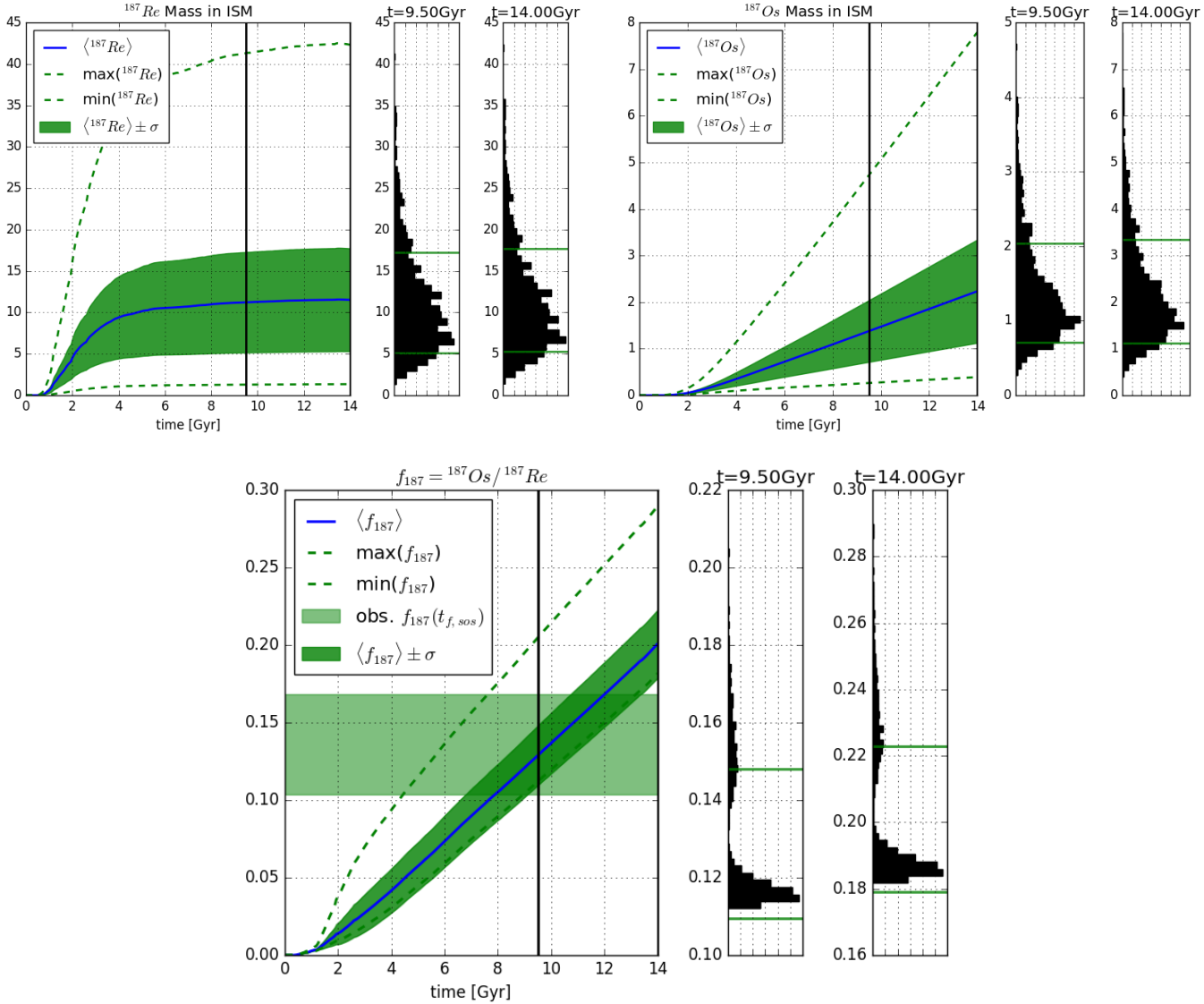




Uncertainties of **Yields+IMFslope**

TODO! insert plot of rates here

Uncertianties of **Yields+IMFslope+NSM**



Uncertianties of **Yields+IMFslope+NSM**