Generating and using neutrino lightcurve data within snewpdag

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Plugings for snewpdag: detected lightcurves

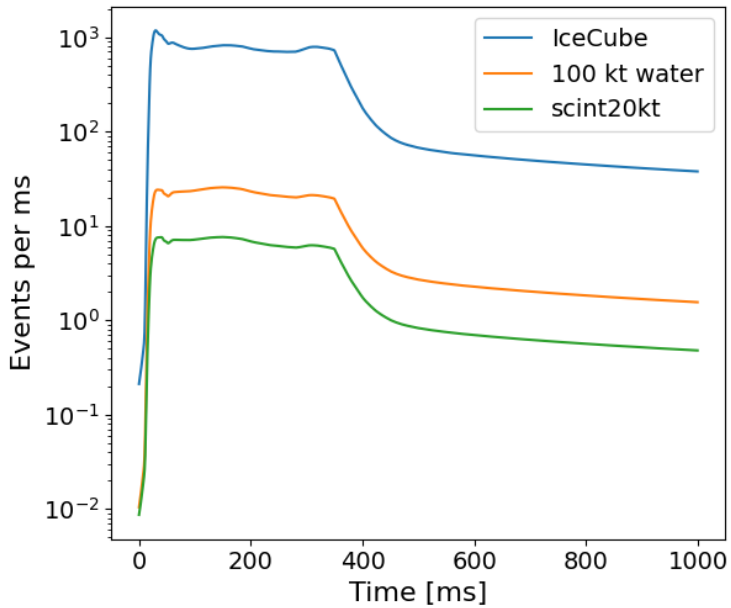
Connection between detected lightcurve models (snewpy) and snewpdag:

- Get the expected lightcurves for different models and detectors from snewpy/snowglobes
- Provide these lightcurves as inputs for snewpdag
  i.e. for later real-time physics analysis (see talk by Kate): pointing, distance estimate, SASI, remnant object etc. + also useful for firedrills!

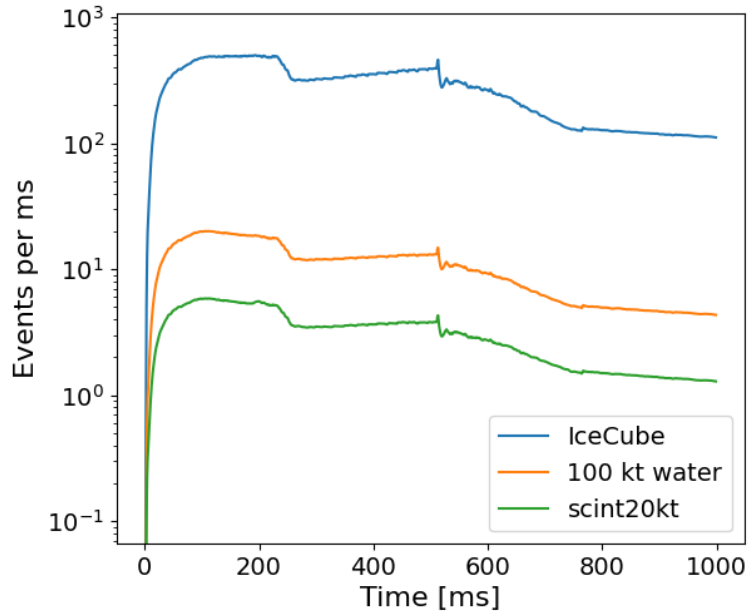
Plugings for snewpdag: detected lightcurves

- snewpy has been modified so that to provide the lightcurve as output
  It can be used with the snewpy Git branch output-lightcurves, built from the latest released snewpy version
- First examples with 1ms bins and 1 sec lightcurve duration

Nakazato 13 $M_\odot$



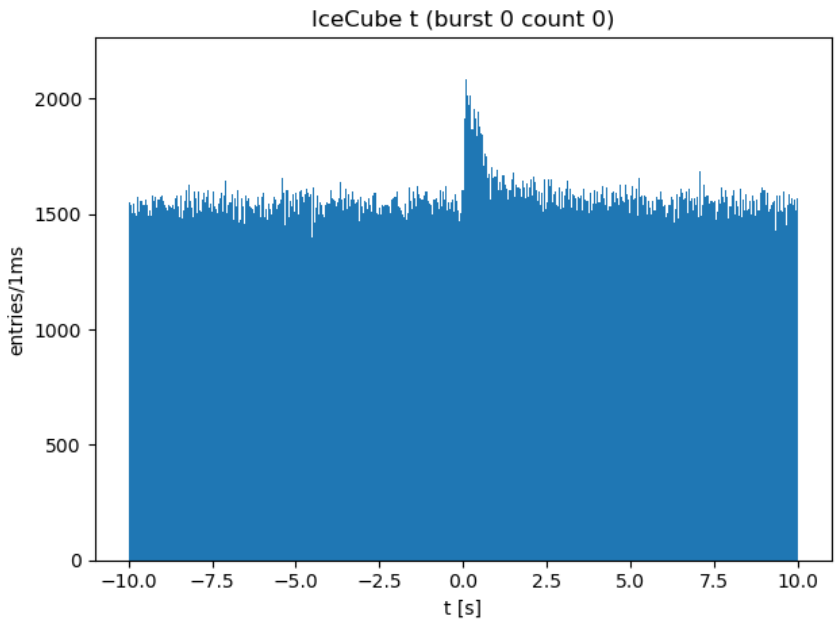
Janka 27 $M_\odot$



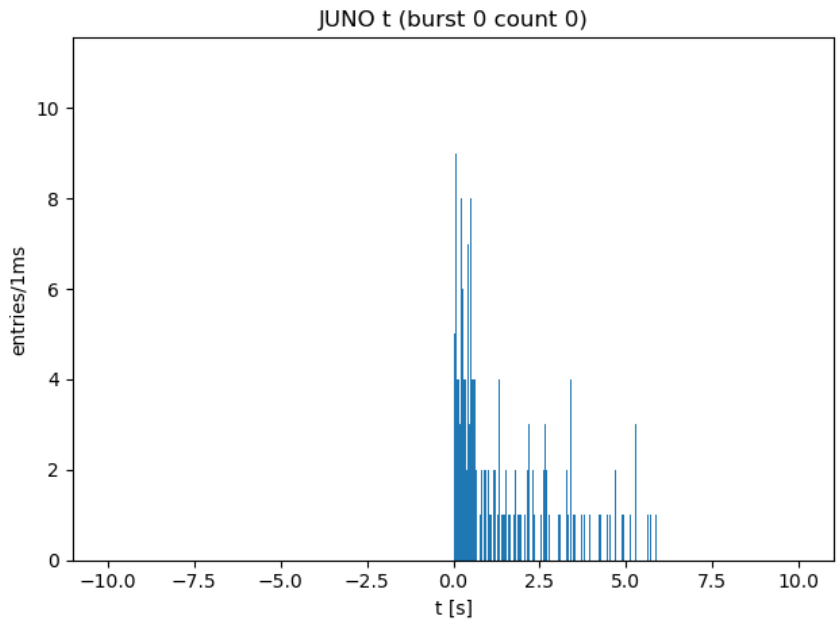
Snewpdag plugins: generators

- snewpdag reads snewpy output to generate pseudo-experiments
- a first snewpdag generator simulates for each trial the lightcurve with:
  - a given time delay (uniform in [-20,20] ms)
  - a background "measurement" (poisson of the expected rate)
- a second generator without adding a time delay or background is also available, which will be used to do trials directly from real data

IceCube

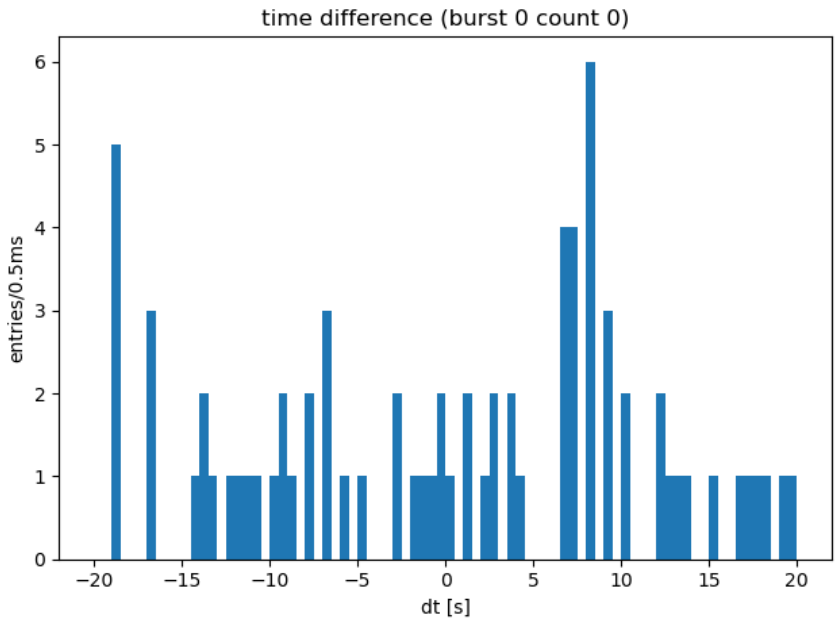


JUNO

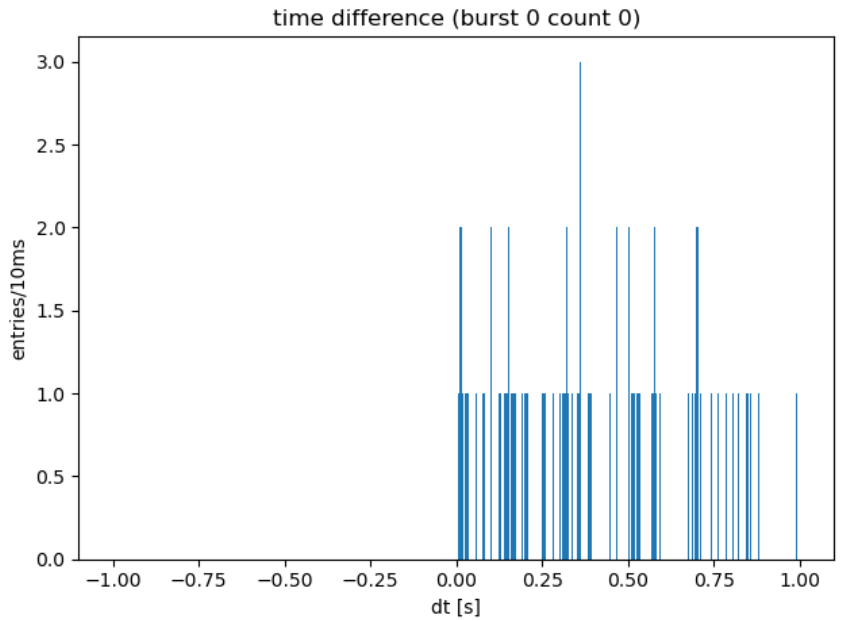


Snewpdag: computation of the time delay

chi2 fit computation
Eur. Phys. J. C 80, 856 (2020)



Using first events (no bias correction)
Phys. Rev. D 100, 103005 (2019)



Conclusions and outlook:

- snewpdag generators based on snewpy output ready
- full chain to generate alerts from different experiments and provide a time delay computed with different algorithms is ready
- more plugins to come soon (see presentation by Jeff)

Back-up

Using generator without including IceCube background or time delay (true dt = 0 in every trial) and the first events the result is what we expect: