LIME light yield in Run2 using recent HV and z scans

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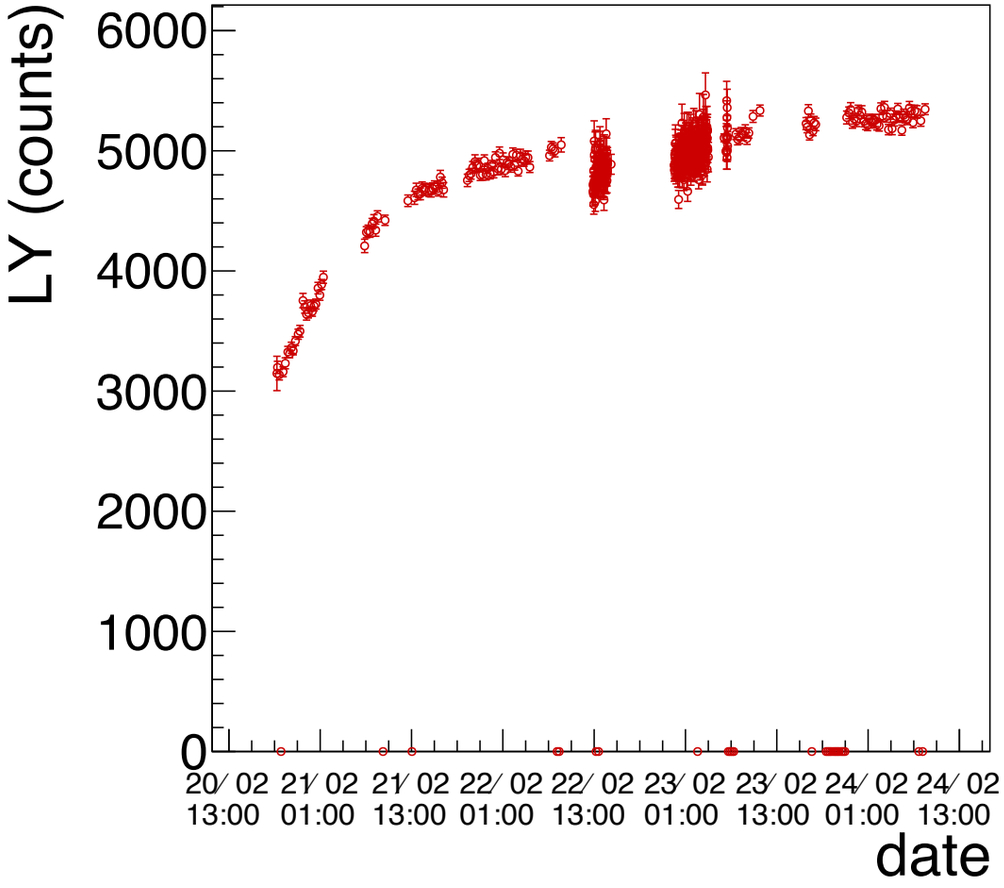
Light yield with flux = 20 l/h

- During past week (Feb 20-24, 2023) data taking with increased gas flow (20 l/h)
  - during the low gas flow (2 l/h) period, observed a much reduced LY wrt Run1:
  - 0.55 ph/eV wrt the 1.3 ph/eV of end of Run1 at same $V_{\mathrm{GEM}} = 420\,\mathrm{V}$ (see last week presentation)
- From the data with fixed HV after the increased gas flow a steady increase of the LY of a factor almost 2, approaching a plateau in ~4 days



$$V_{GEM1} = 420\,V$$

$$V_{GEM2} = 420\,V$$

$$V_{GEM3} = 420\,V$$

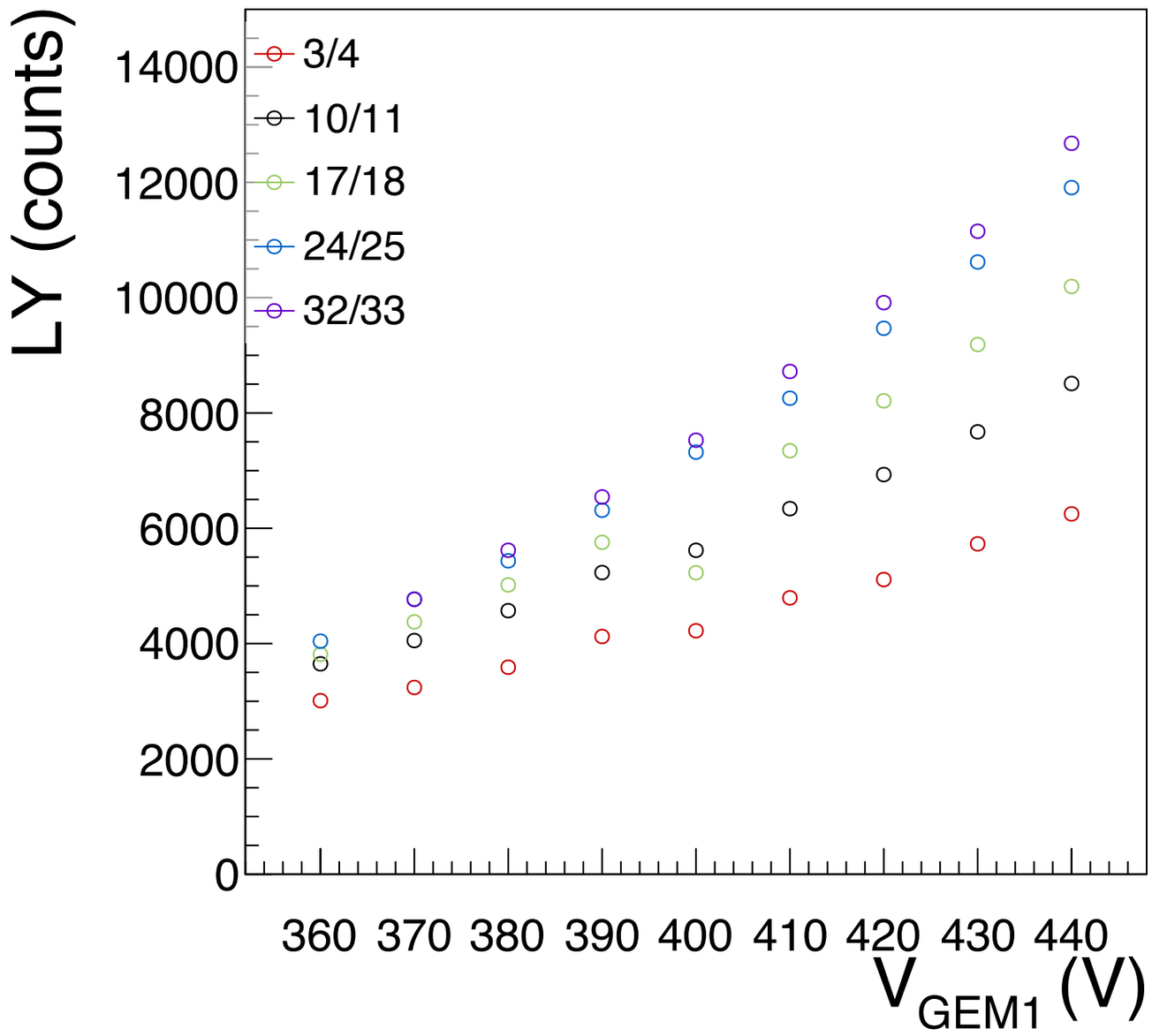
$$\mathrm{flow} = 20\mathrm{l/h}$$

HV scan at different Z: light yield

- "3/4" means z within 3th and 4th ring, etc. (3/4 ~ closest to the GEMs - most saturated point, 32/33 ~ farthest from the GEM)

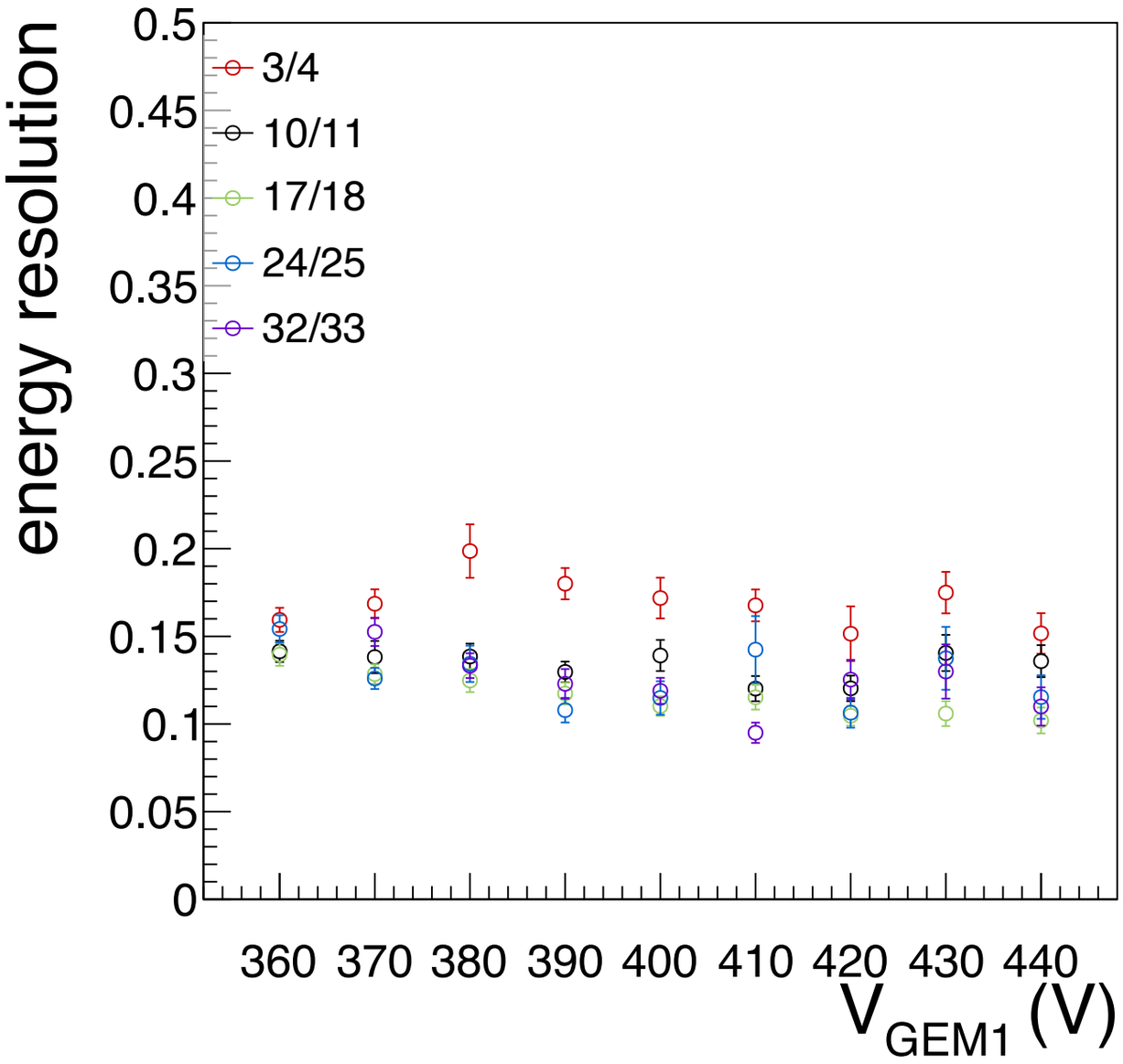
At HV=440 V => $LY_{z-max} \approx 1.4 \times 10^4$

- higher than at LNF (was $\approx 8 \times 10^3$)
- no frequent discharges observed, so used this as golden condition:
  - flux = 20 l/h
  - HV(GEM) = 440 V



HV scan at different Z: raw resolution

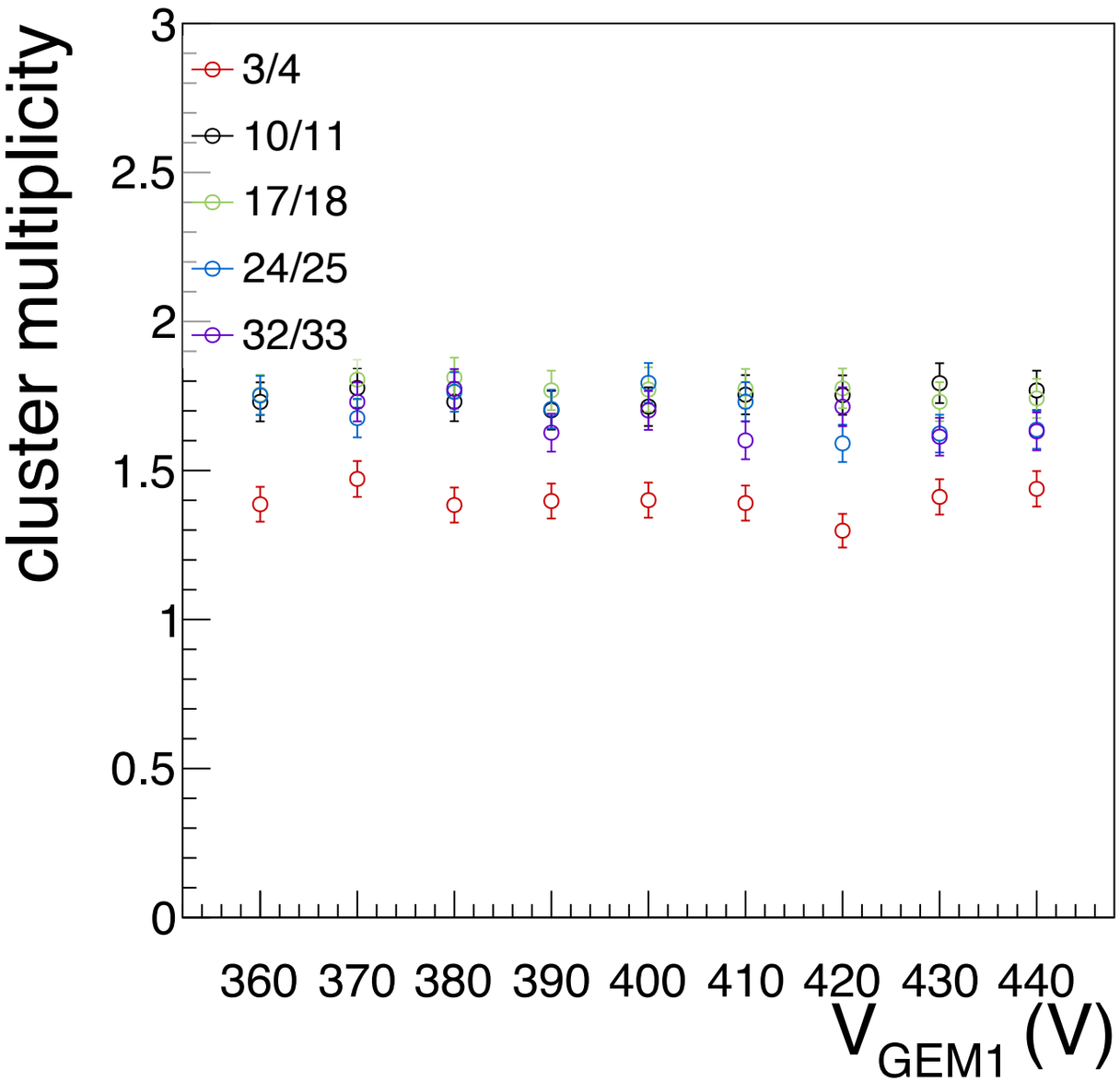
- Apart the highly saturated point, at any z the raw cluster energy resolution is between 12-15%
- I will try to use this data to train a new regression
  - different HV settings needed to different energy values)



HV scan: efficiency

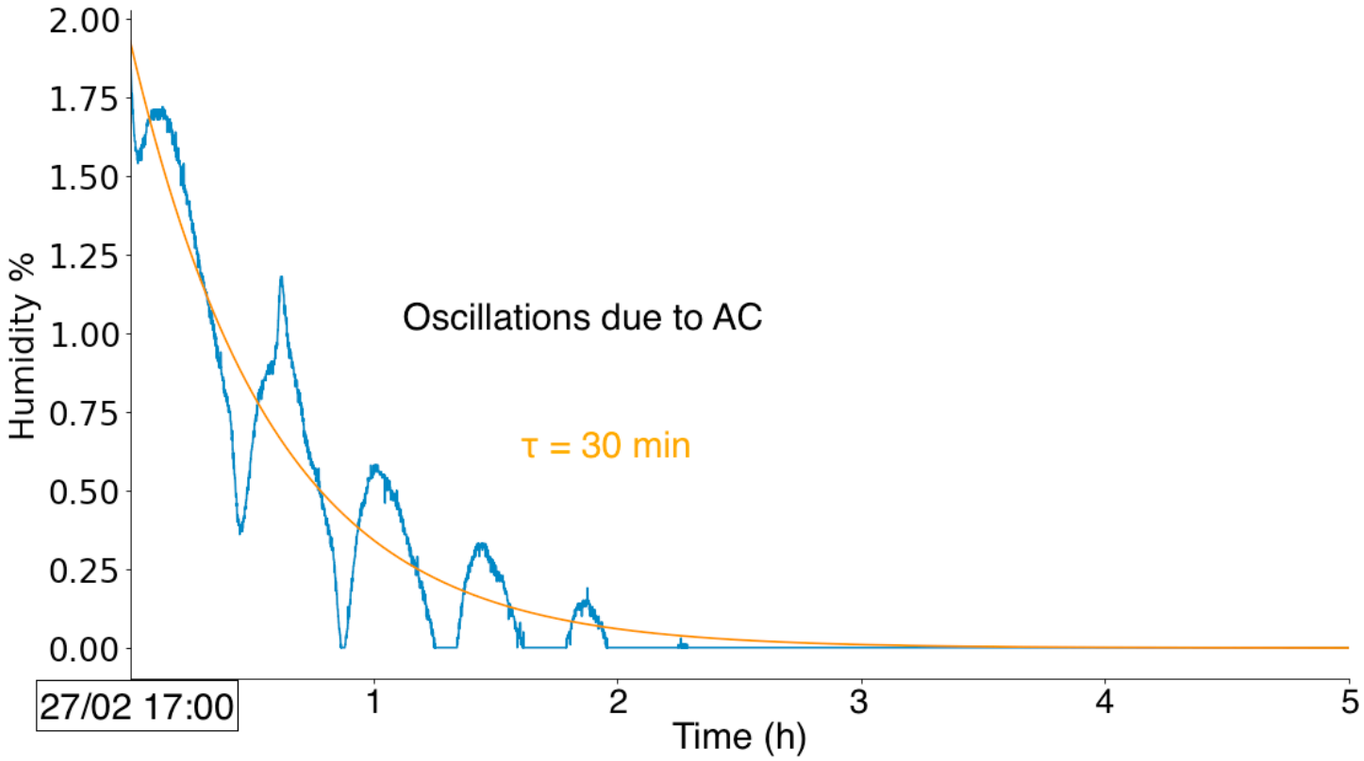
- Average number / image of clusters within R=800 pixels from the center with L<5 cm and loosely compatible with a round spot
  - average ~ **1.7 clusters / 300 ms ~ 5.7 Hz**
  - efficiency constant down to low LY (i.e. down to low energy?)

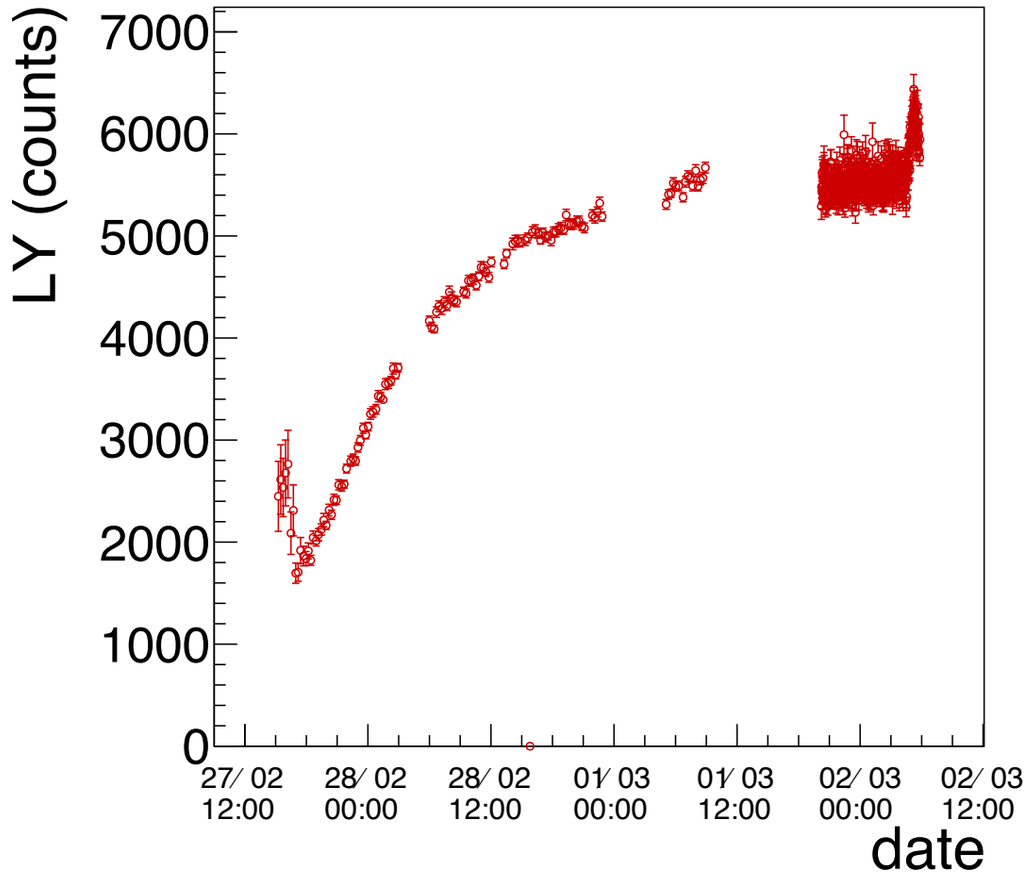
- Worth investigating how low we can go before starting loosing efficiency ?



LY history after the gas problem

- During weekend of Feb 26 there has been a gas problem, with pressure rapidly decreasing. On Monday, restored the 20 l/h gas flux and HV=420 V.
- LY started again low and steadly recovered with time





- The decrease in the humidity (which is negliglible both in the measurement and from extrapolation when the measurement was significative) does not explain the LY increase
  - humidity is constantly 0 after 27/02 ~ 20:00, but LY increases smoothtly afterwards