



# The use of detrending tools in the study of giant stars in the CoRoT Exo channel

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Knowledge for Tomorrow



# introduction

## filtering algorithms

- ▶ this talk arises from a collaboration between the Red Giants Team and the Exoplanet Detection Team
  - ▶ J. Montalbán, F. Baudin, B. Mosser. . .
- ▶ the Detection Team has analyzed 162 000 light curves looking for transiting planets
  - ▶ remove stellar variability
  - ▶ remove instrumental residuals
  - ▶ find transiting candidates
- ▶ the experience fo the Detection Team could be applied to the research of Red Giants
  - ▶ signal in the range  $2\mu\text{Hz}$  to  $100\mu\text{Hz}$



# introduction

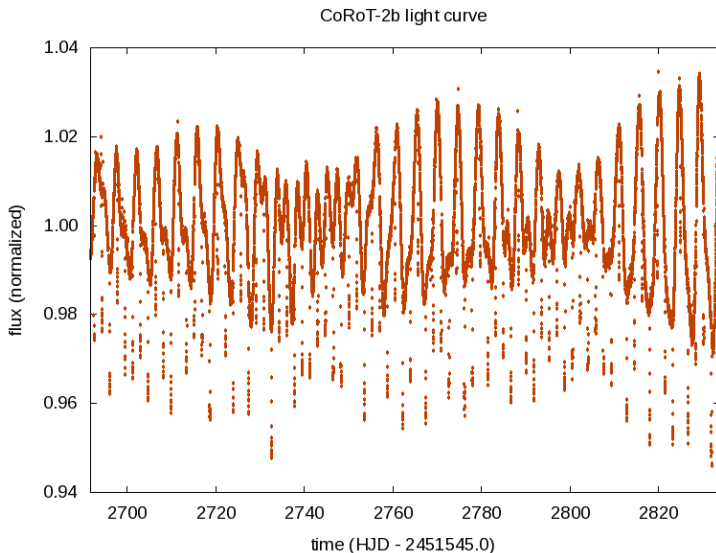
## filtering algorithms

- ▶ how to remove the variability and the instrumental features preserving the signal?
- ▶ Savitzky-Golay
  - ▶ for every region ( $\sim 1.5d$ ), a model of the variability is built
  - ▶ model: Legendre-Polynomials (degree 5)
  - ▶ description: Cabrera et al. (2012) A&A, 548
- ▶ wavelets
  - ▶ see talk later today by S. Grziwa
- ▶ sliding median windows
  - ▶ see Bonomo et al. (2012) A&A, 547
- ▶ ...
  - ▶ in the CoRoT context, see review Erikson et al. (2012) A&A, 539



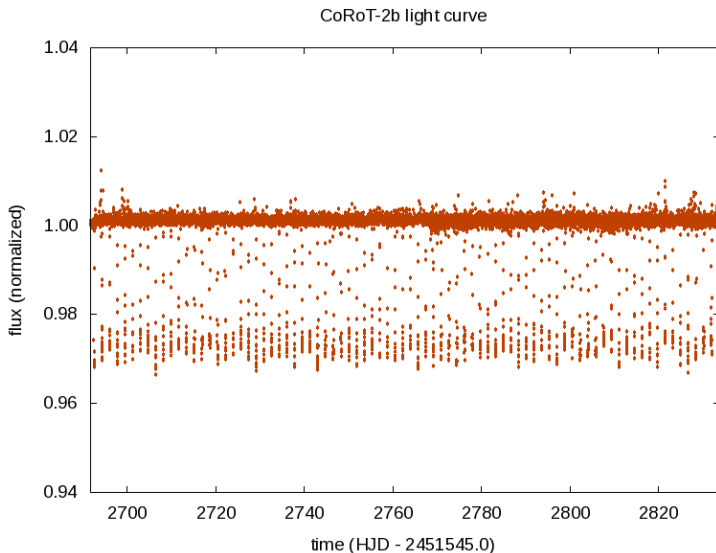
# filtering algorithms applied to transiting planets

the case of CoRoT-2b



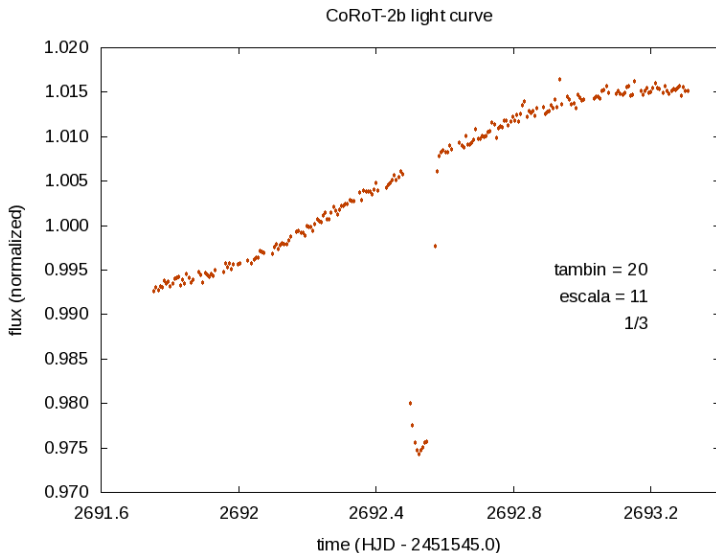
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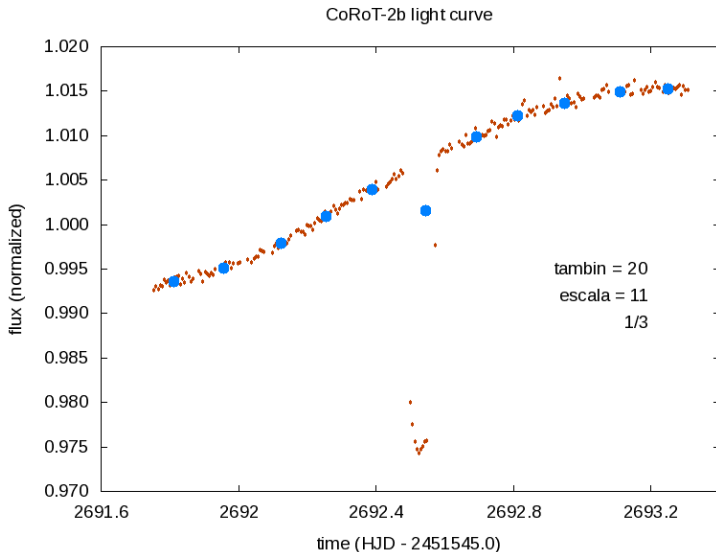
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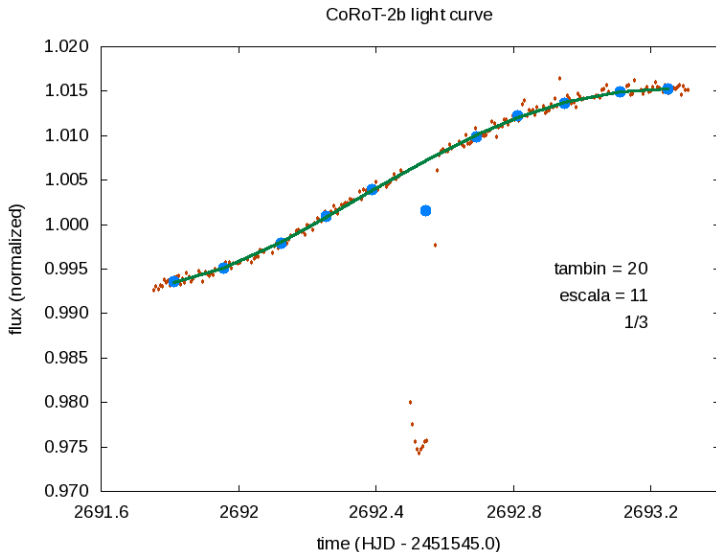
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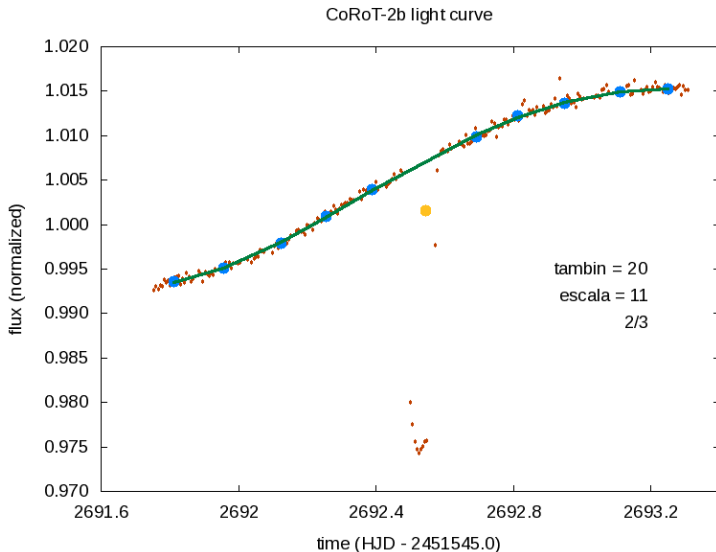
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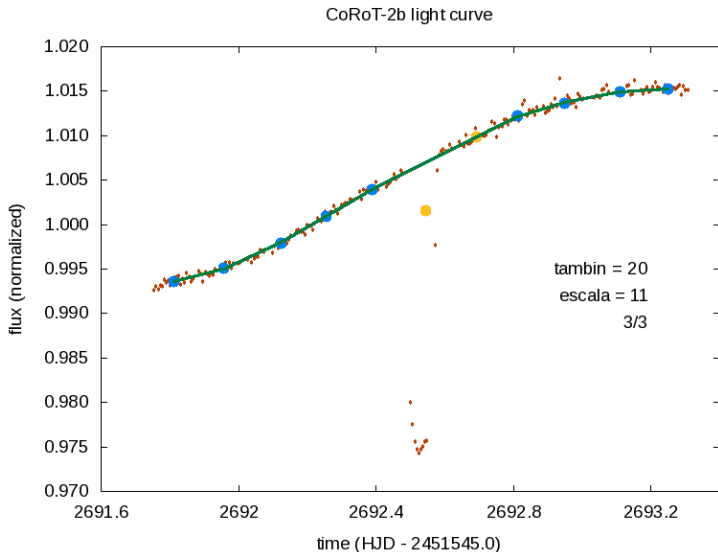
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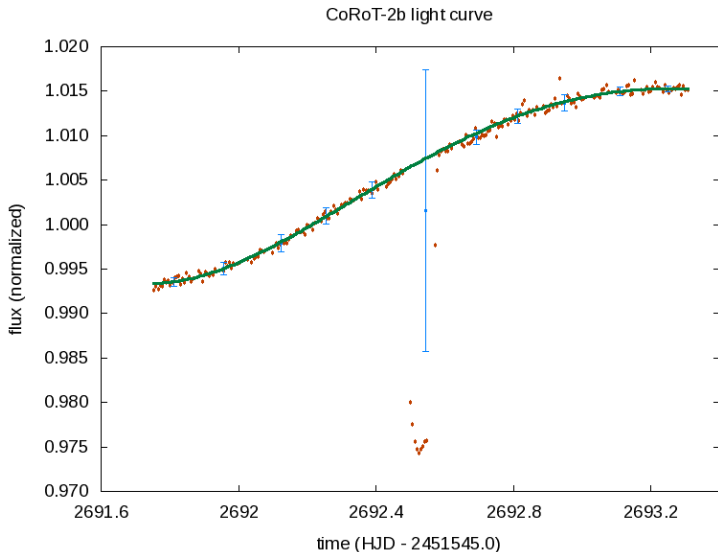
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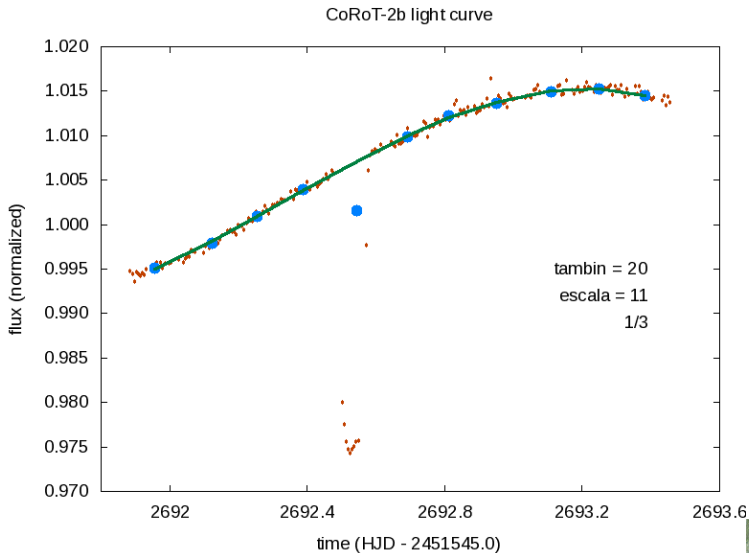
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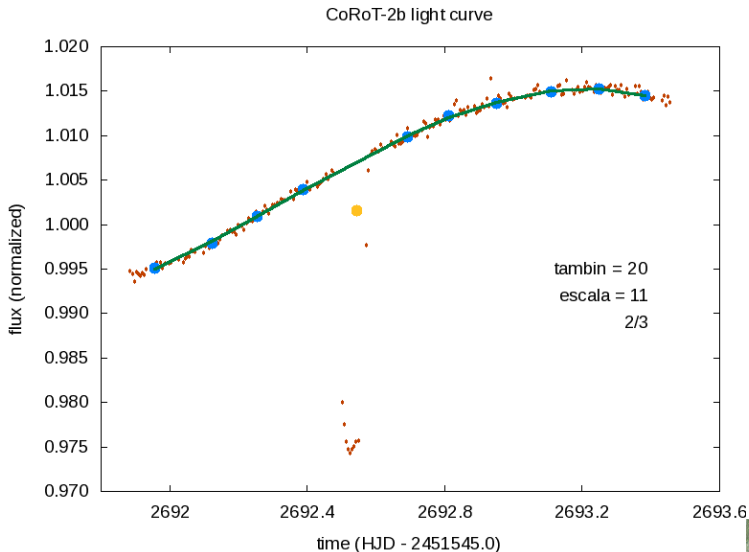
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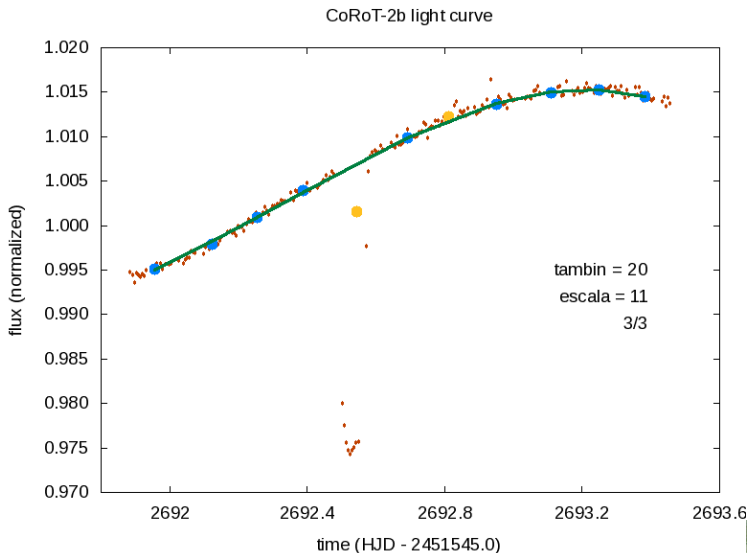
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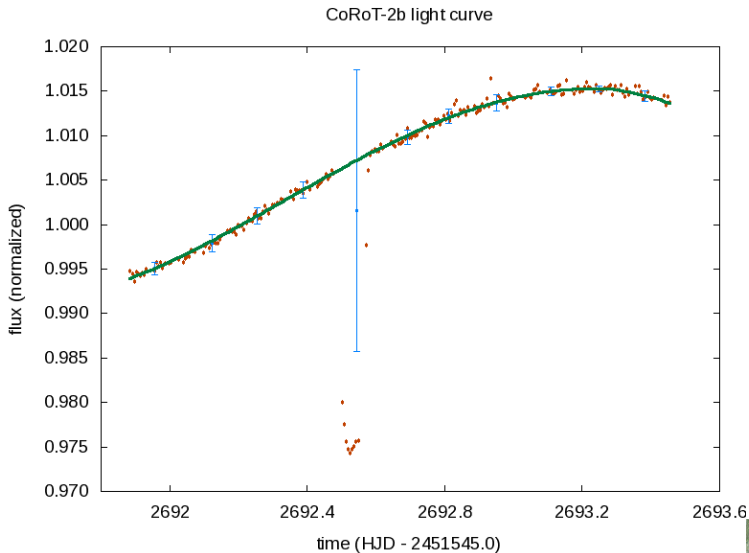
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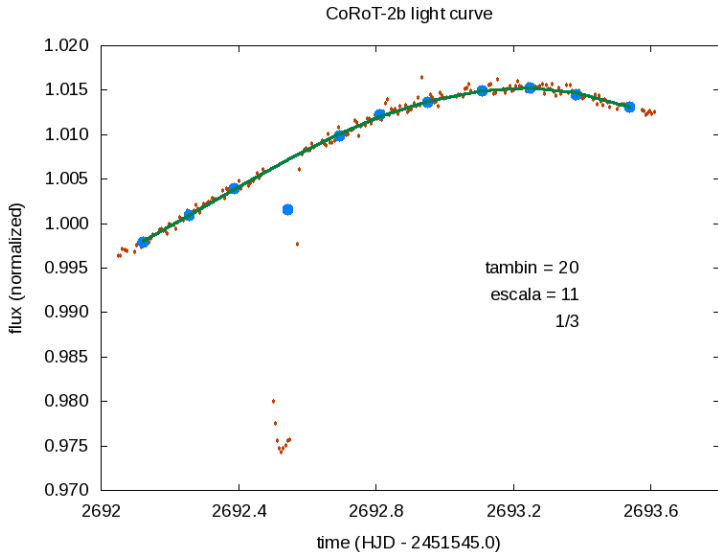
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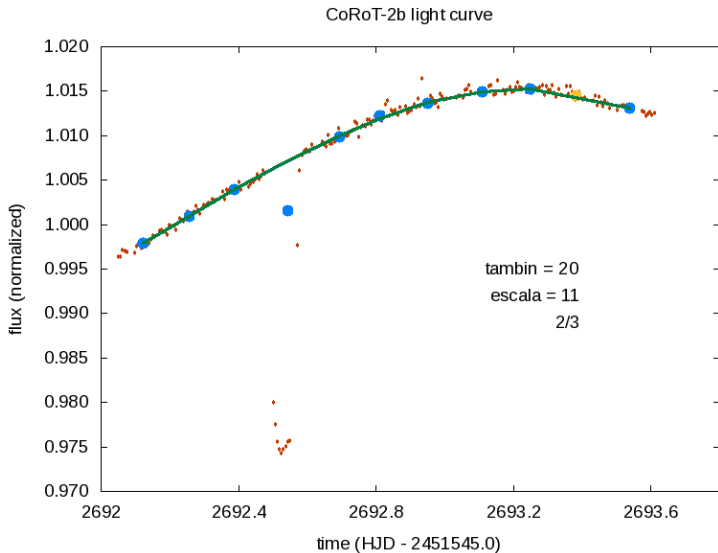
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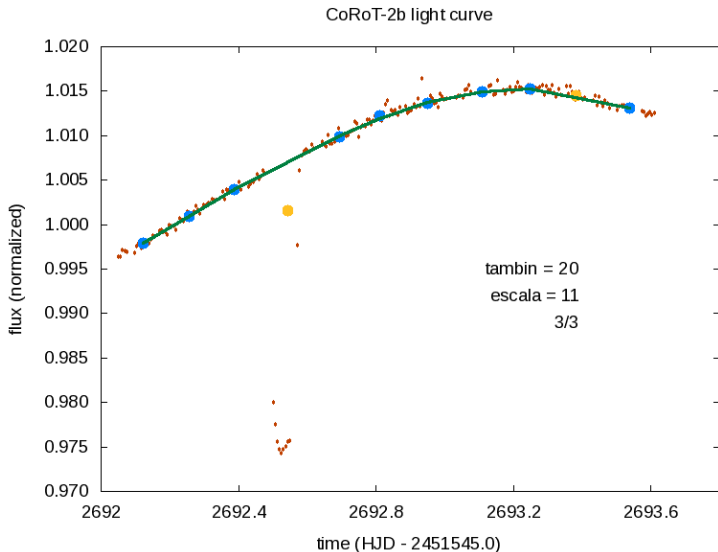
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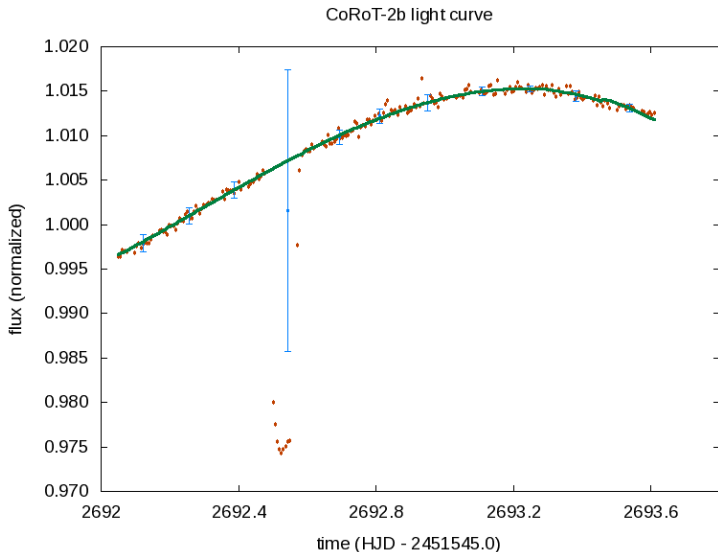
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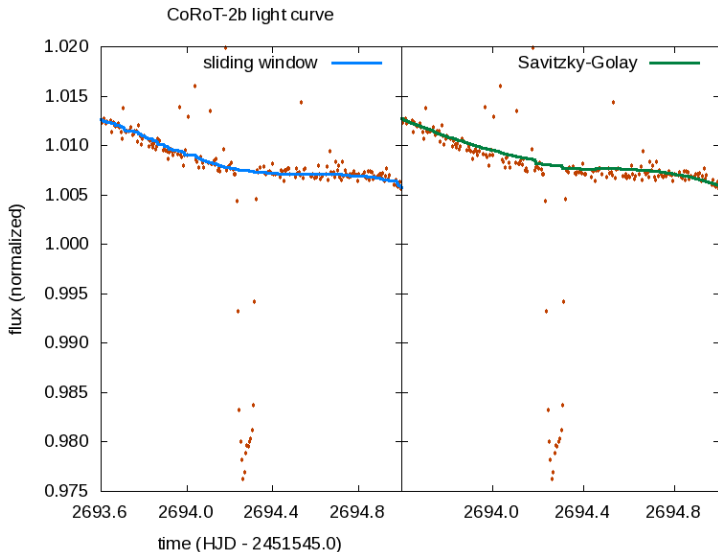
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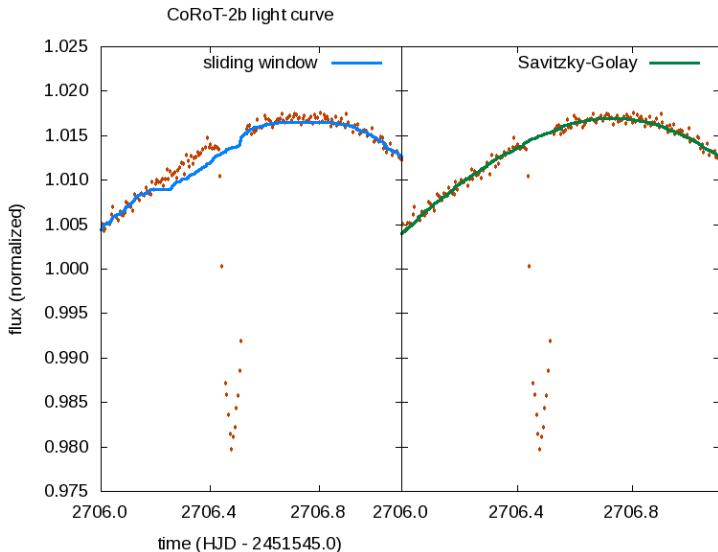
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comparison of Savitzky-Golay and sliding median window



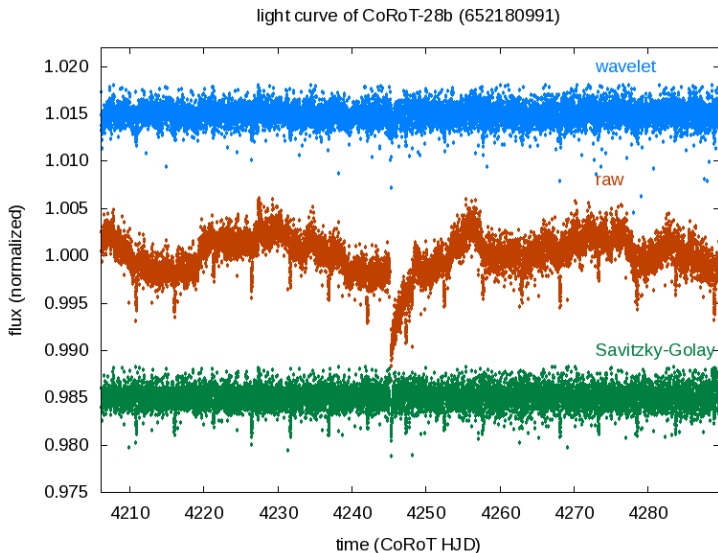
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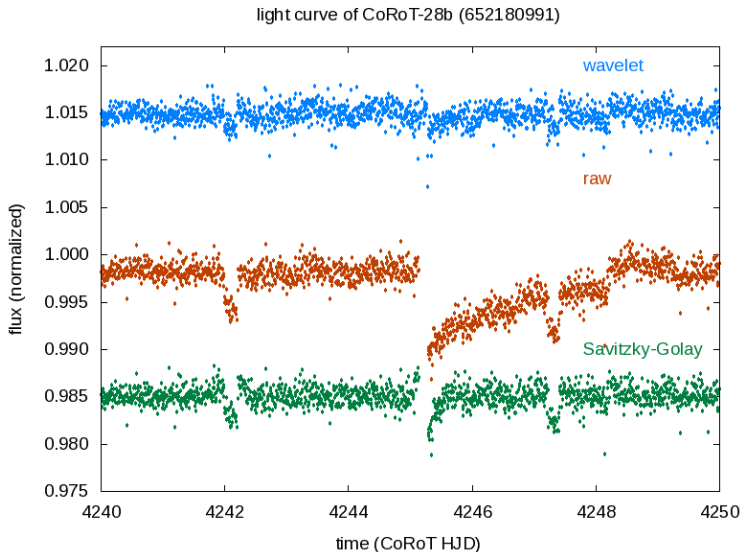
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## comparison of Savitzky-Golay and wavelets



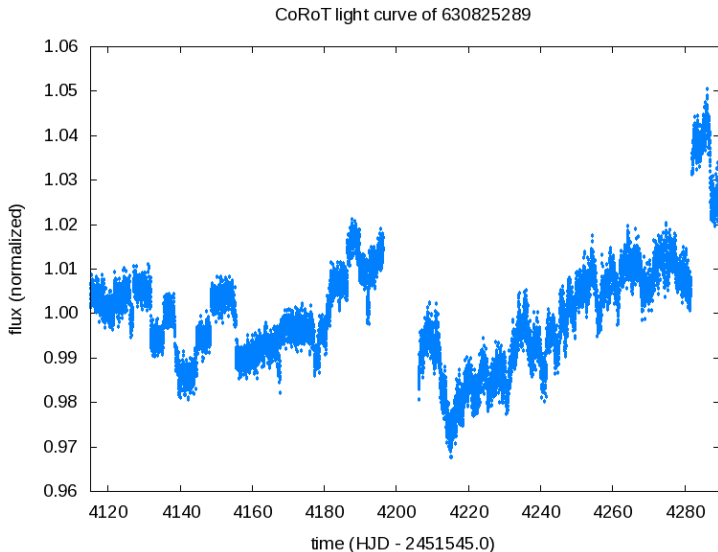
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# filtering algorithms applied to giant stars

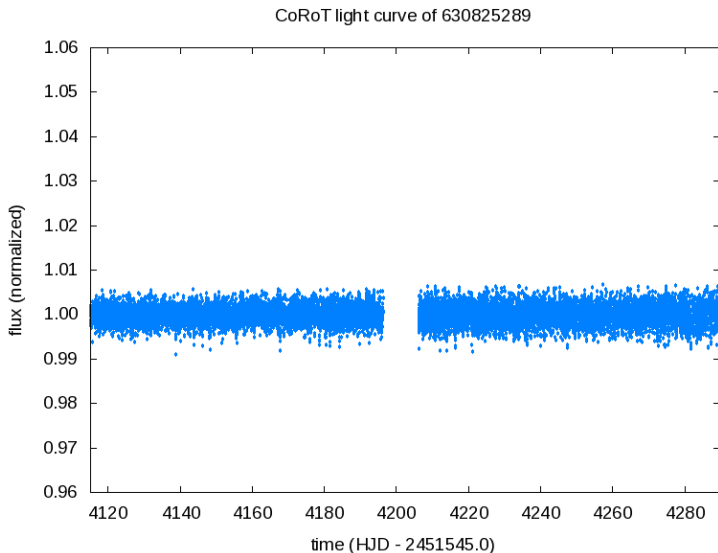
the case of 630825289





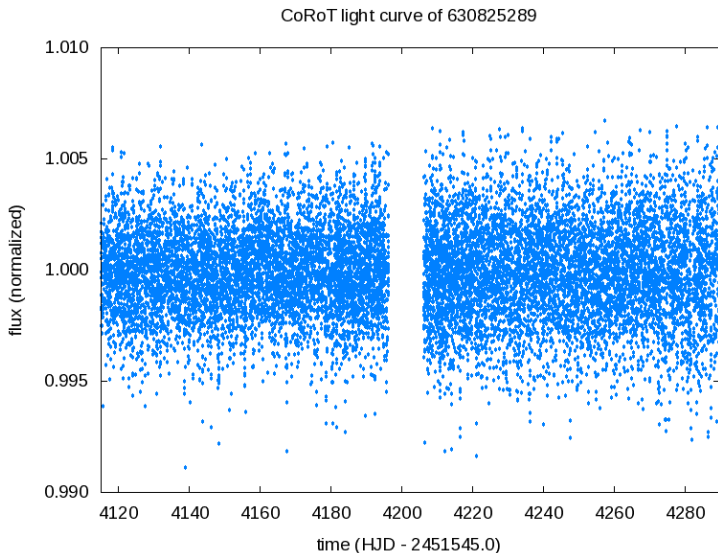
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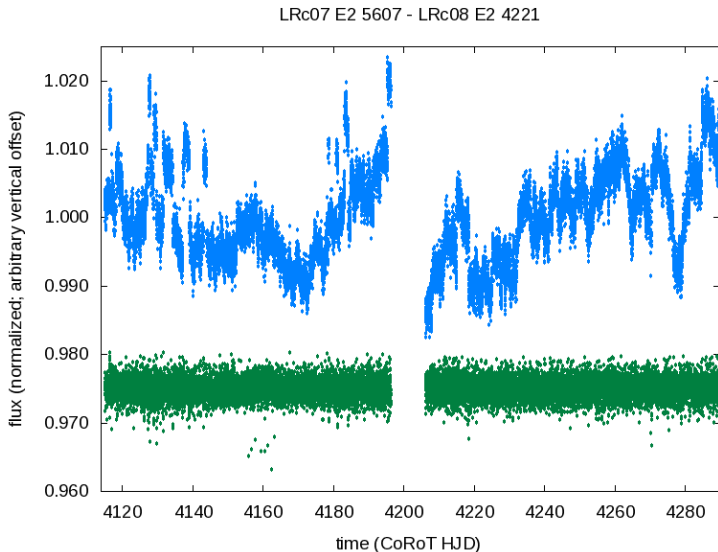
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# filtering algorithms applied to giant stars

the case of 630825404



# conclusions

The use of detrending tools in the study of giant stars in the CoRoT Exo channel

- ▶ we have successfully applied the DLR filtering algorithm, designed and optimized for the search of transiting planets, to the requirements of the Red Giants Team
- ▶ the algorithm removes efficiently discontinuities (hot pixels) and long term variability
- ▶ but low-frequency components are also heavily filtered out
  - ▶ OK for the seismic signal, but not for the background signal
- ▶ next steps, find out if the algorithm can be optimized to preserve this information

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