

Fitting GRB211211A with a photospheric model including radiation-mediated shocks



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Photospheric spectrum from GRB211211A

A photospheric model including radiation-mediated shocks (RMSs) is used to fit data from GRB211211A. The model fits very well, even better than the typically used Band function. This shows that photospheric spectra can be both soft and broad enough to describe typical GRB observations.

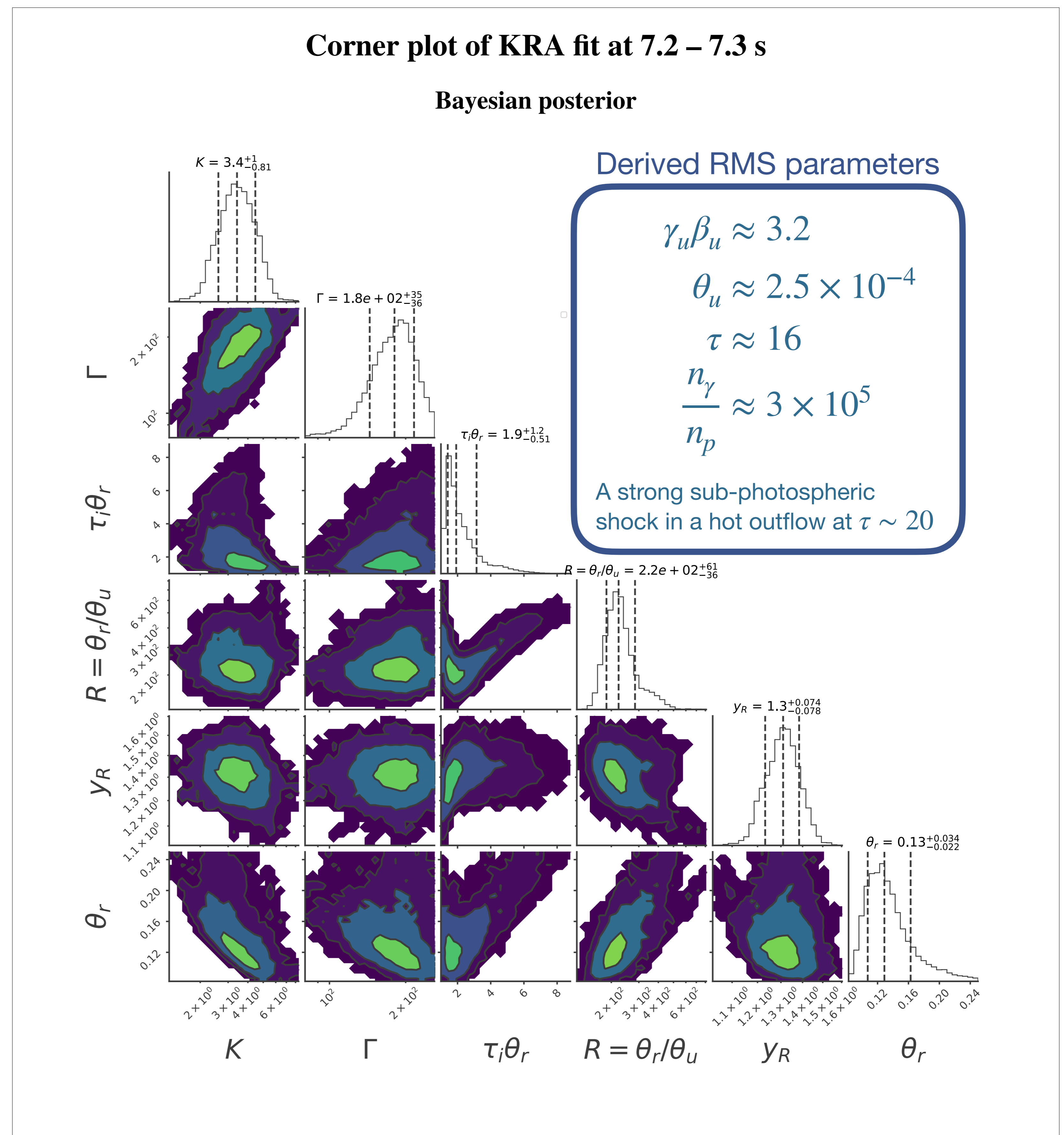
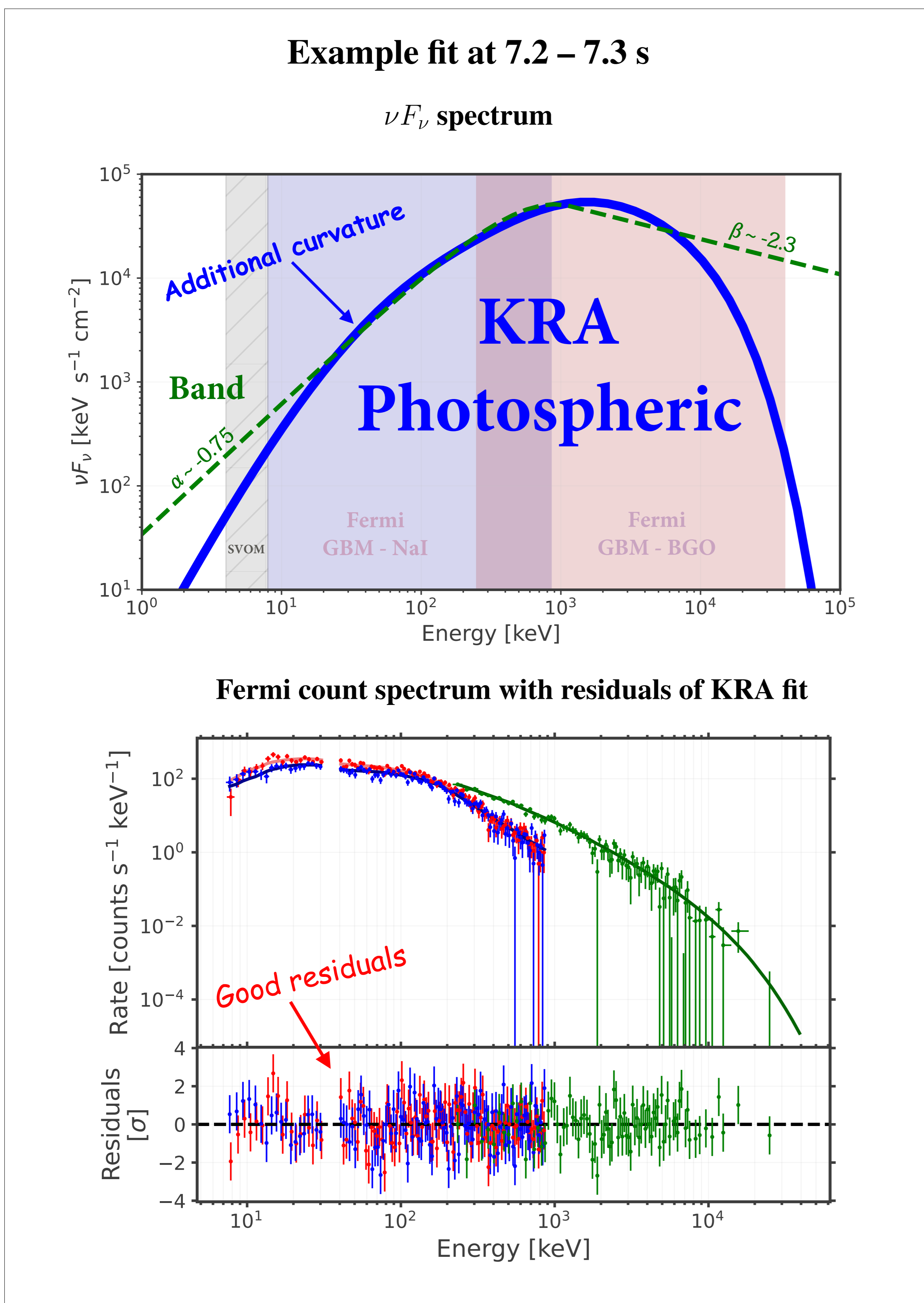
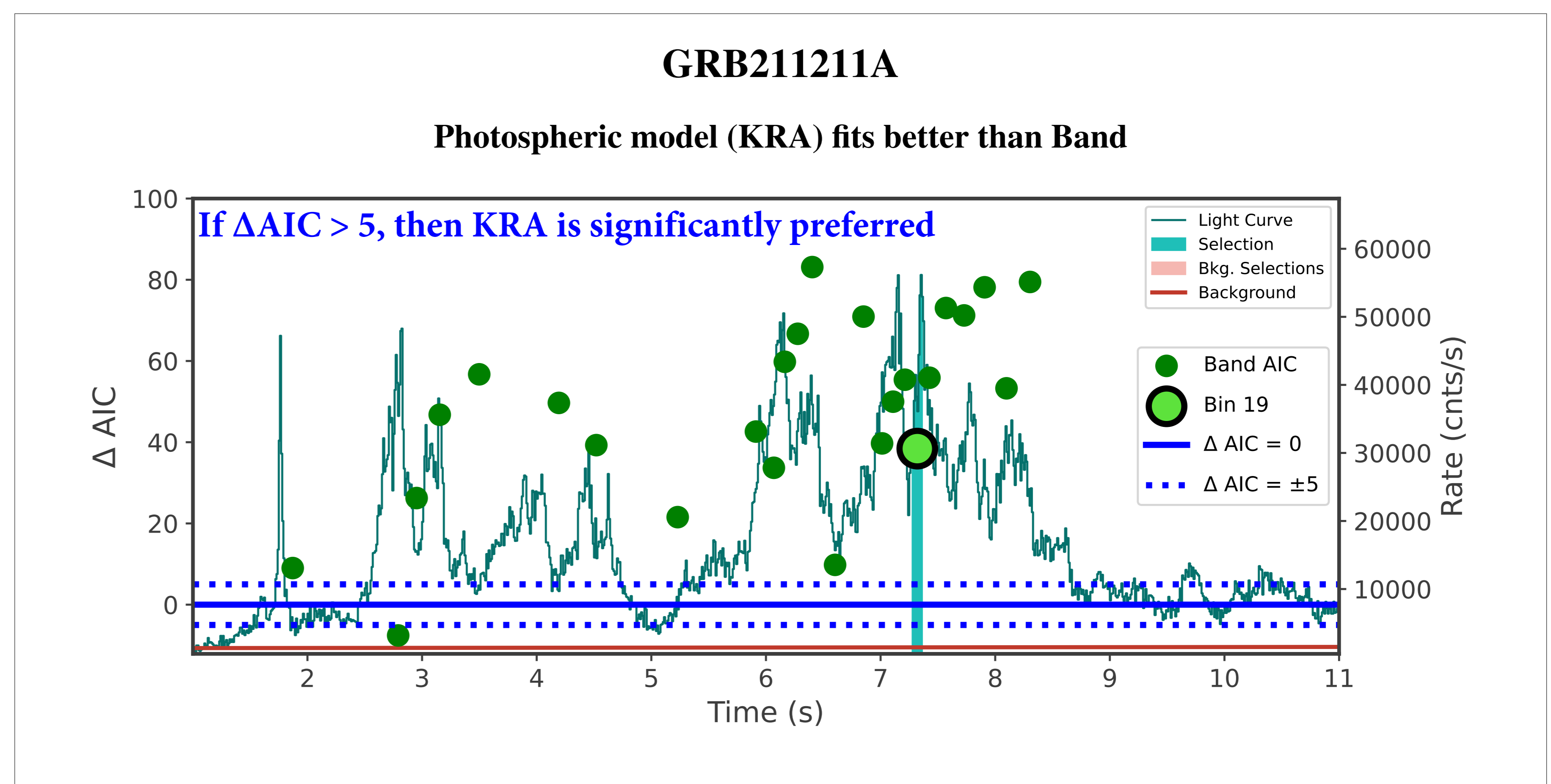
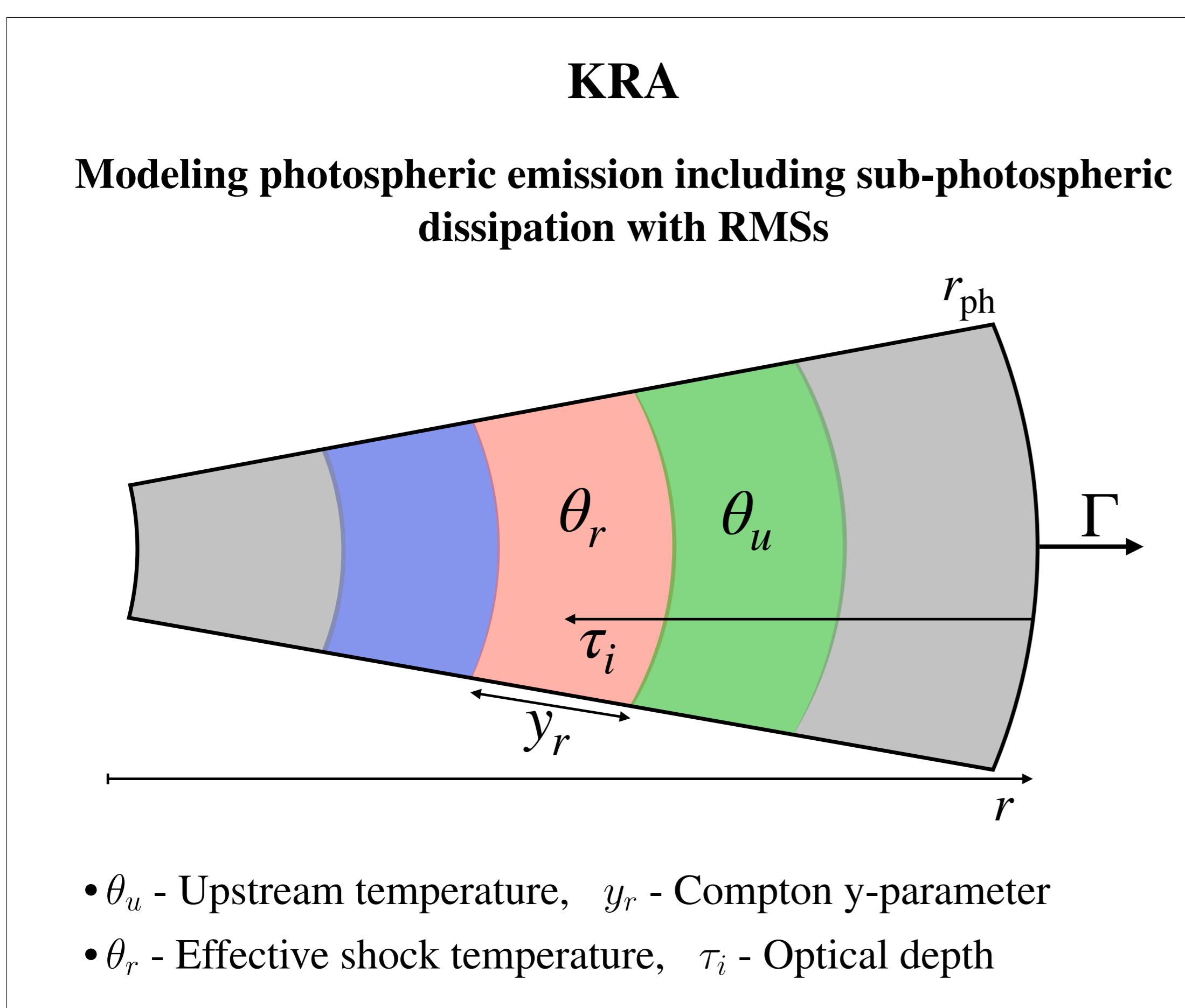
Constraining physical parameters

Within the framework of the photospheric model we can derive the physical RMS parameters. Exemplifying with time bin 19 (7.2-7.3 s), we find that the data is well described by a strong sub-photospheric shock (high $\gamma_u\beta_u$) in a hot outflow (high θ_u) at a moderate optical depth ($\tau \sim 20$) in a photon rich environment ($n_\gamma/n_p \sim 3 \times 10^5$).

The Kompaneets RMS Approximation (KRA)

This is made possible thanks to the Kompaneets RMS approximation (KRA; Samuelsson et al. 2022), which is an accurate and extremely fast way to model sub-photospheric dissipation through radiation-mediated shocks in GRBs. The low computational cost of the model allows us to study these types of shocks in a quantitative way.

Please ask me about the figures!



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Further Reading



Samuelsson, Lundman,
and Ryde (2022)



Samuelsson and Ryde
(2023)