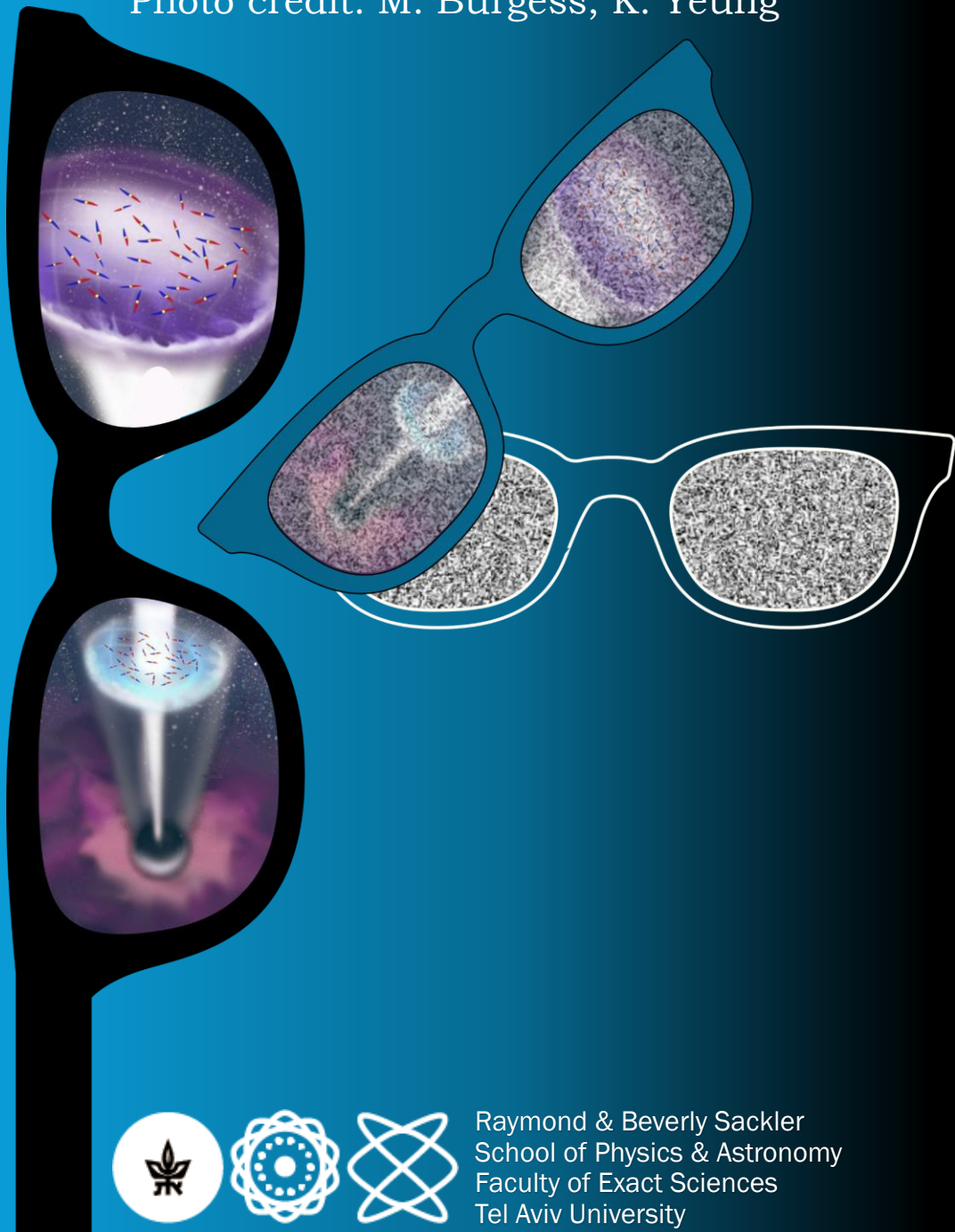


Photo credit: M. Burgess, K. Yeung



Afterglow Linear Polarization Signatures from Shallow GRB Jets

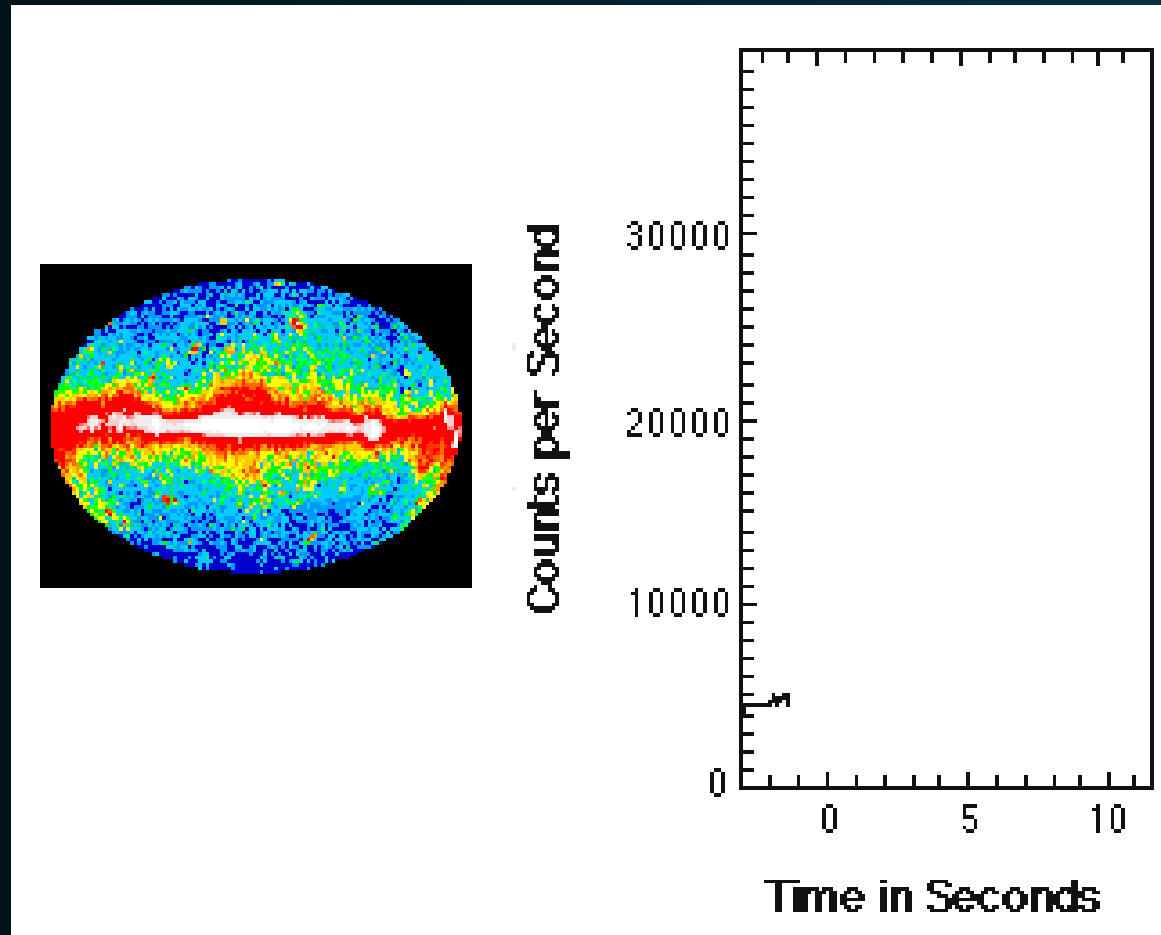
GAL BIRENBAUM

+ RAMANDEEP GILL, OMER BROMBERG,
PAZ BENIAMINI AND JONATHAN GRANOT

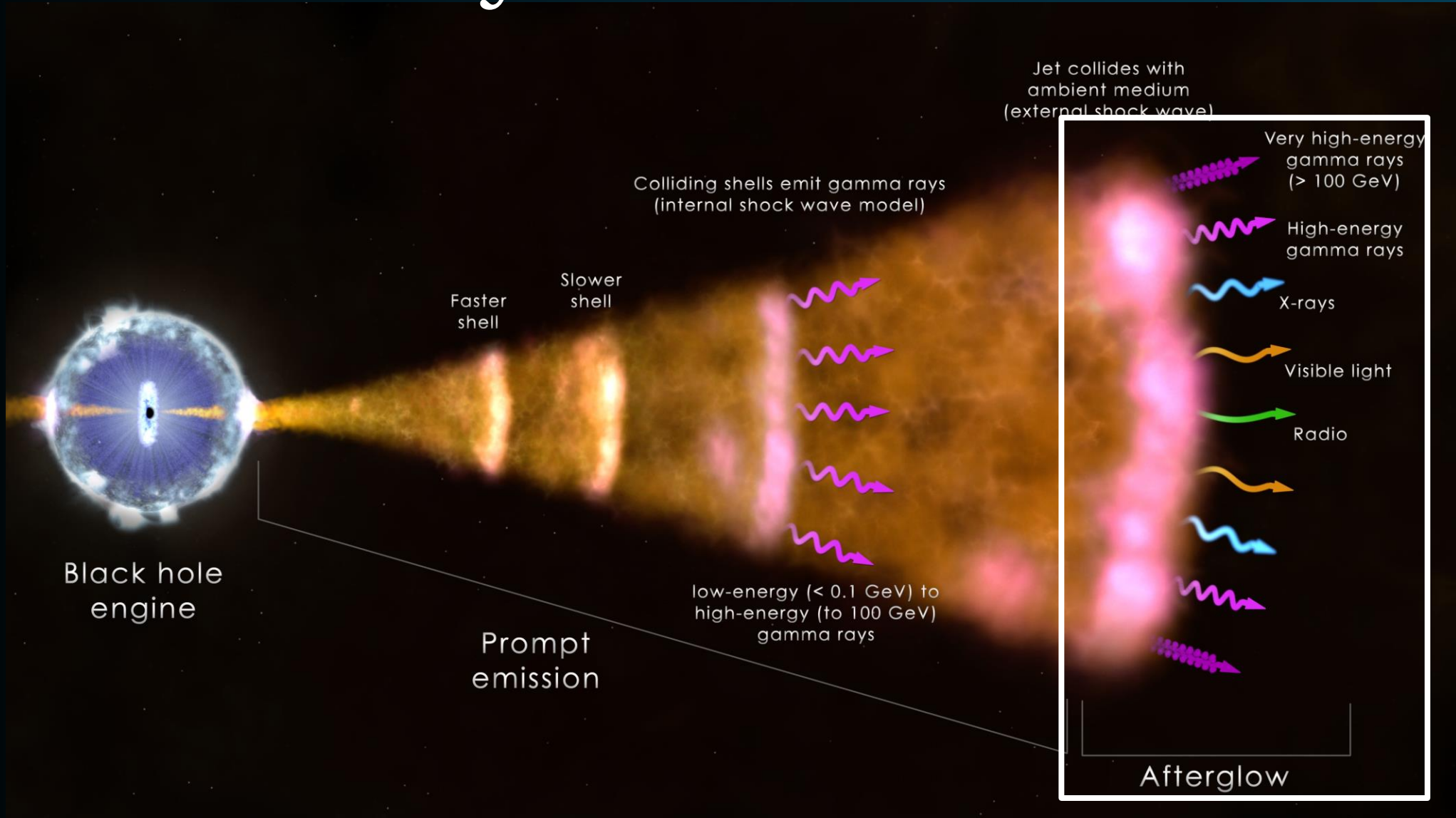


Raymond & Beverly Sackler
School of Physics & Astronomy
Faculty of Exact Sciences
Tel Aviv University

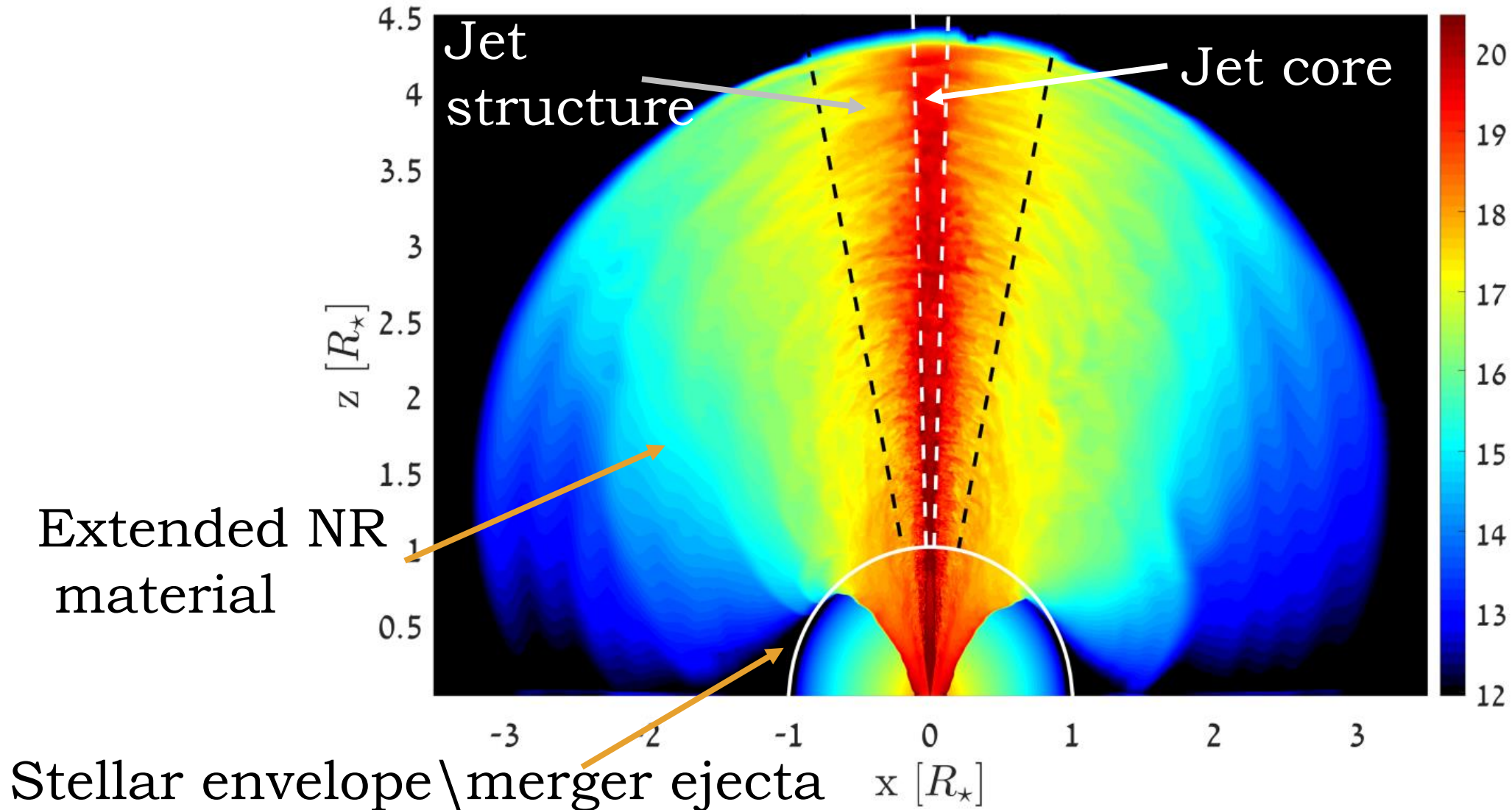
Gamma-Ray Bursts



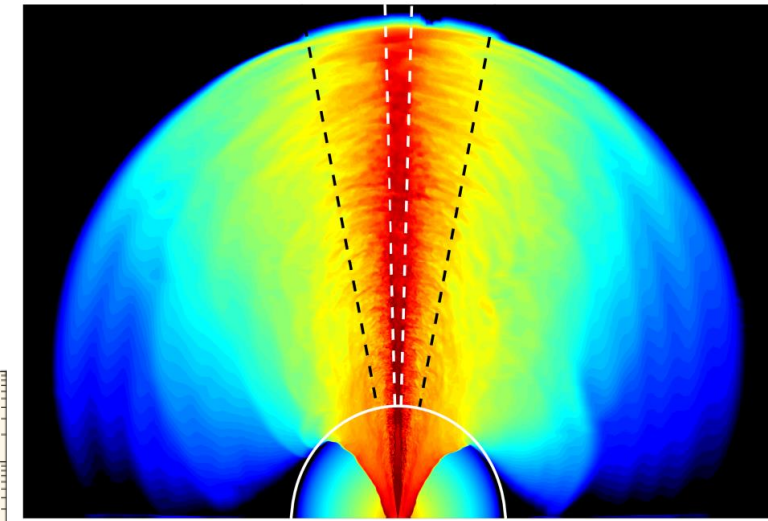
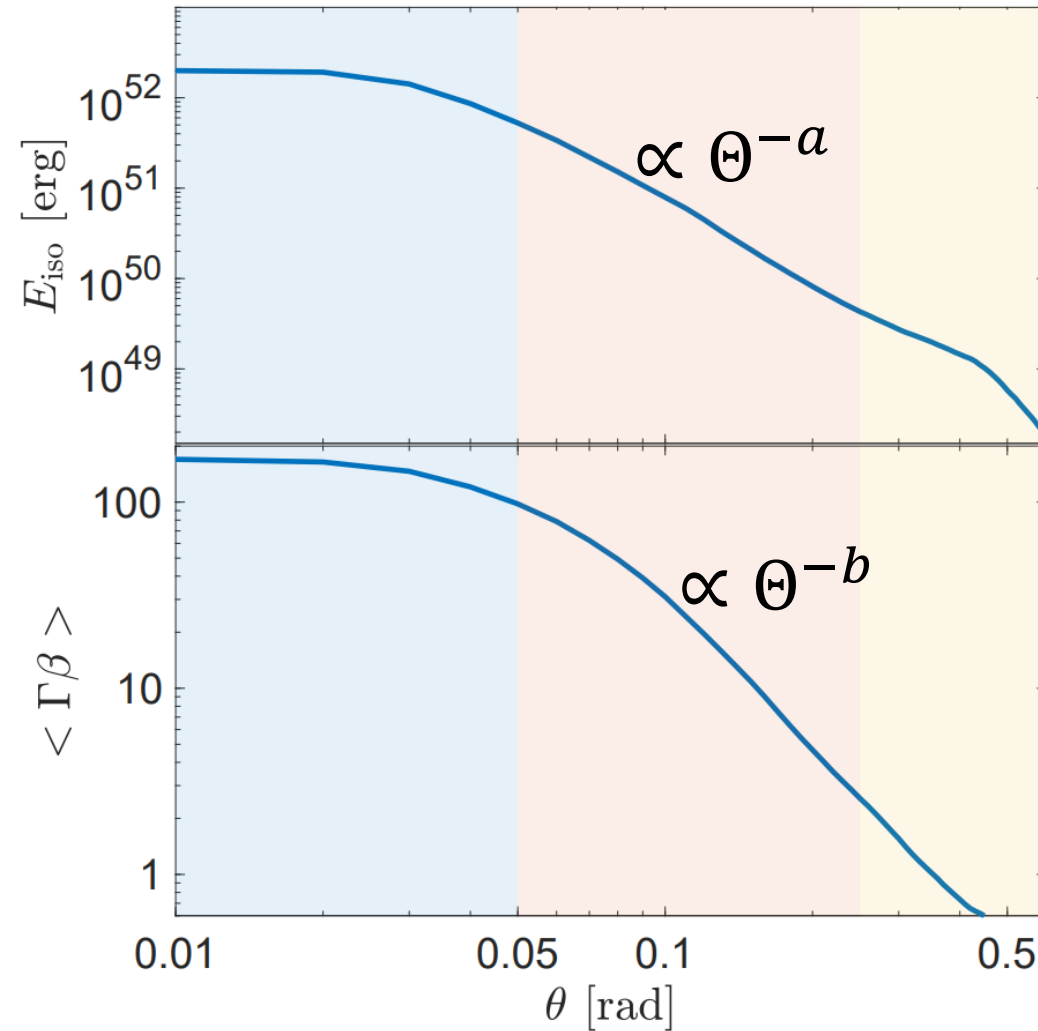
Gamma-Ray Bursts



Formation of Structured Jets



Power-law Jets



Gottlieb et al. 2021

Nakar (2020)
Beniamini et al. 2022

GRB 221009A - Observations

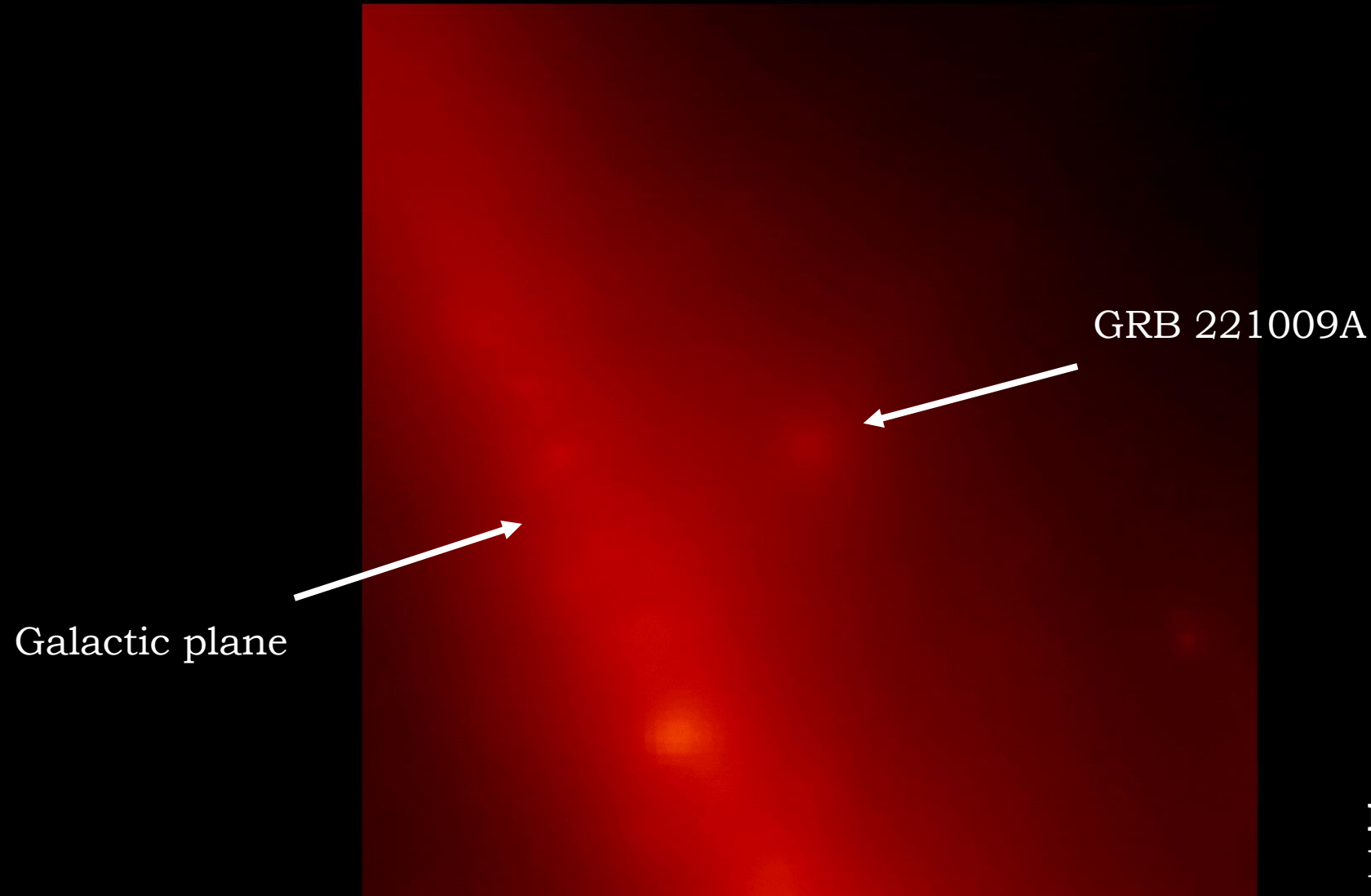
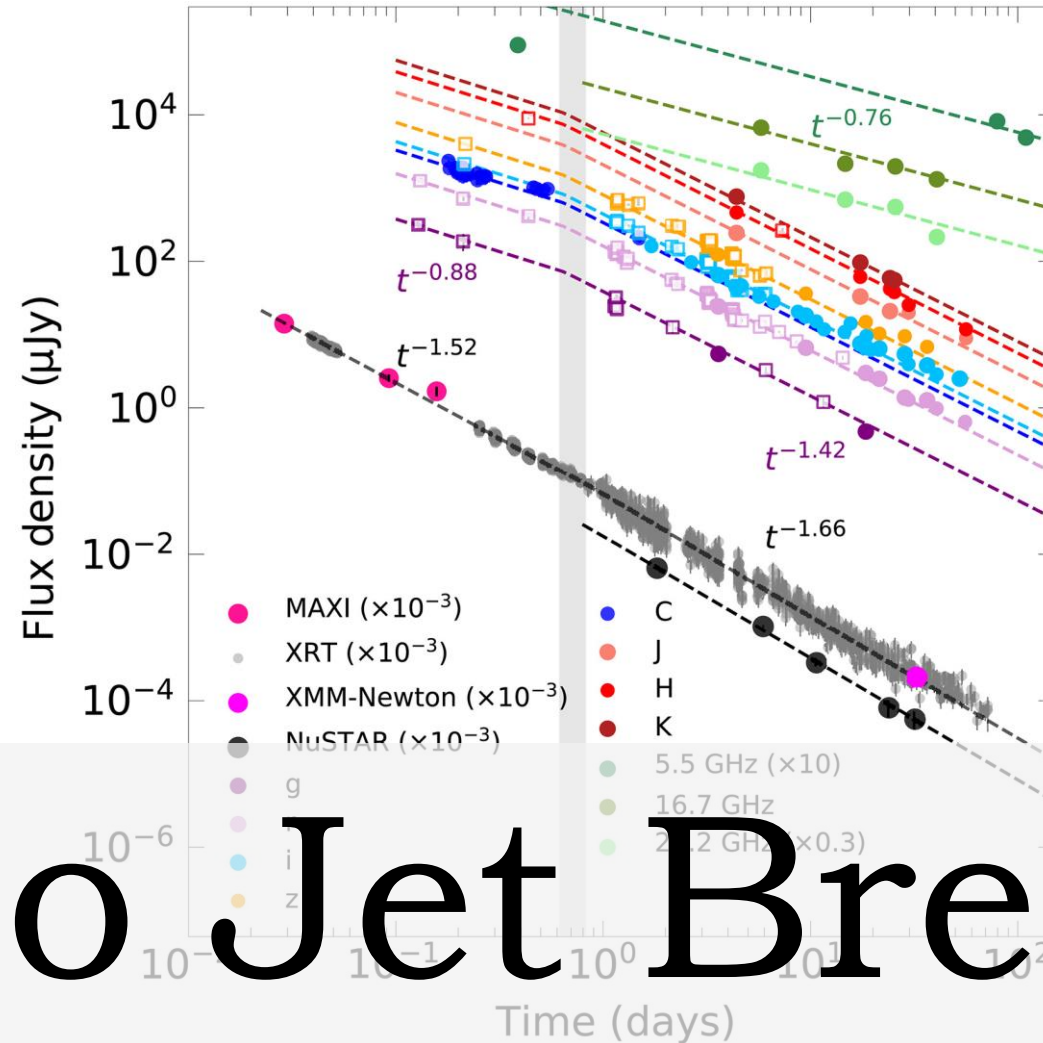


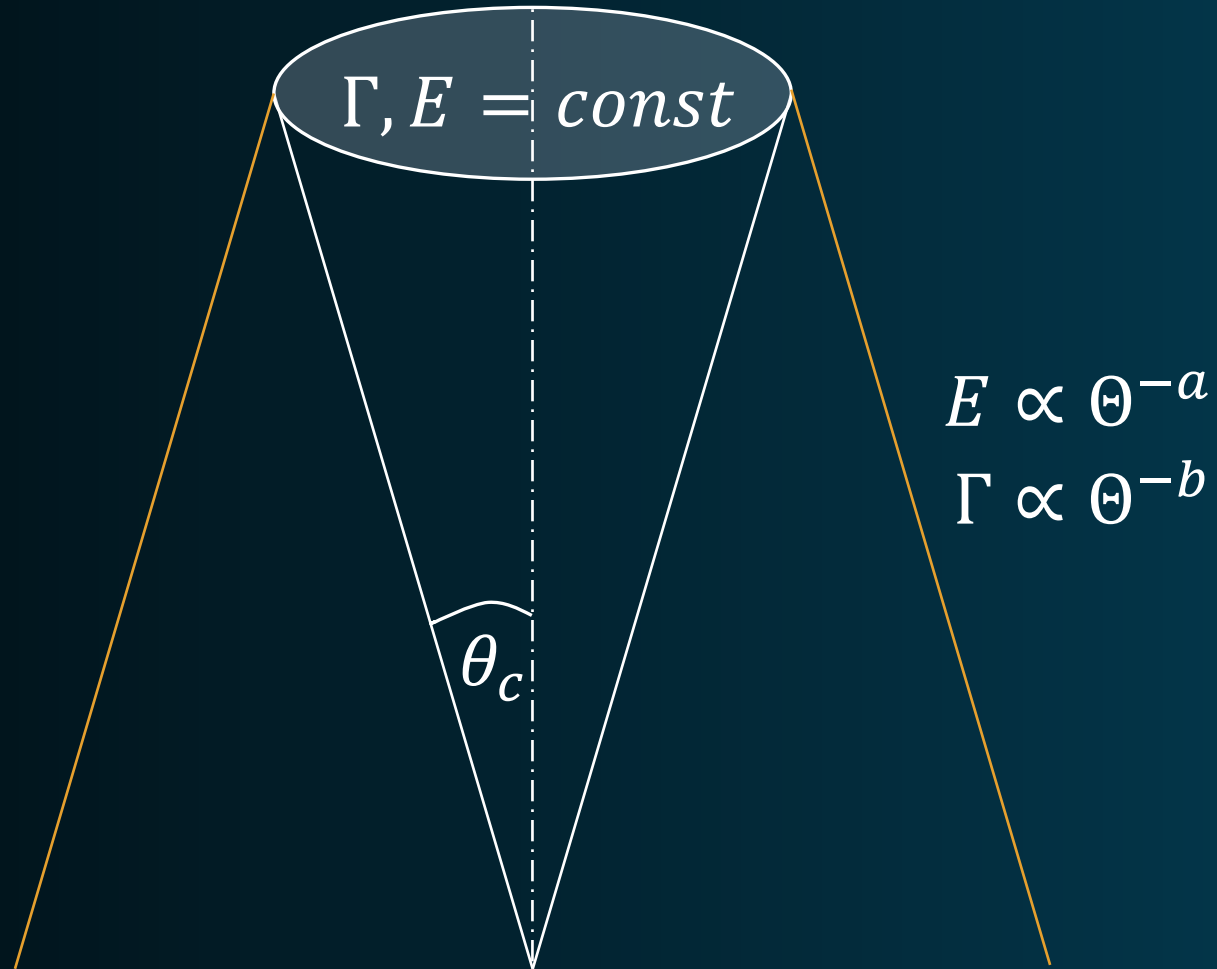
Image Credit:
NASA, DOE,
Fermi LAT Collaboration

GRB 221009A - Observations

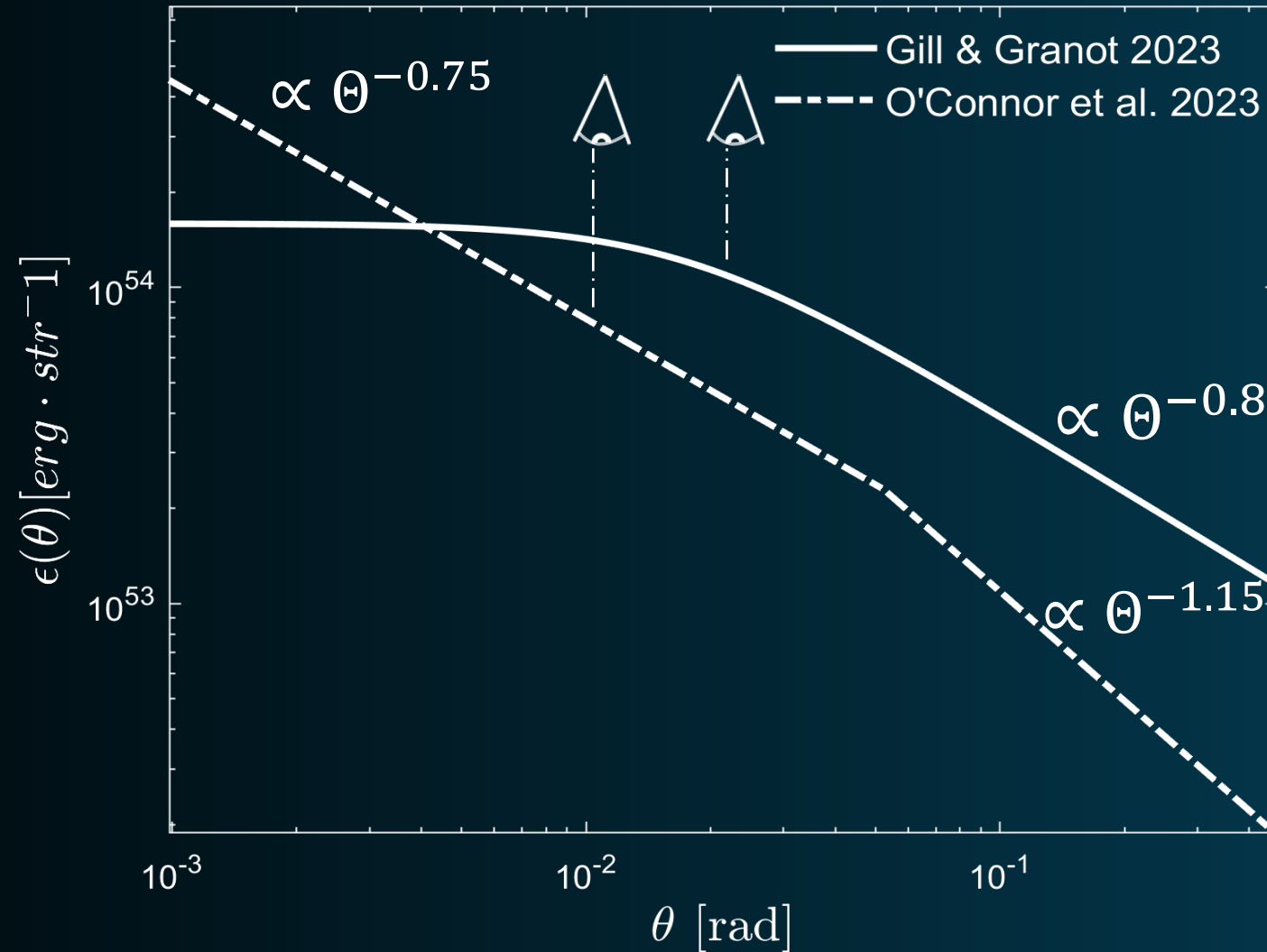


No Jet Break!

Shallow Jets

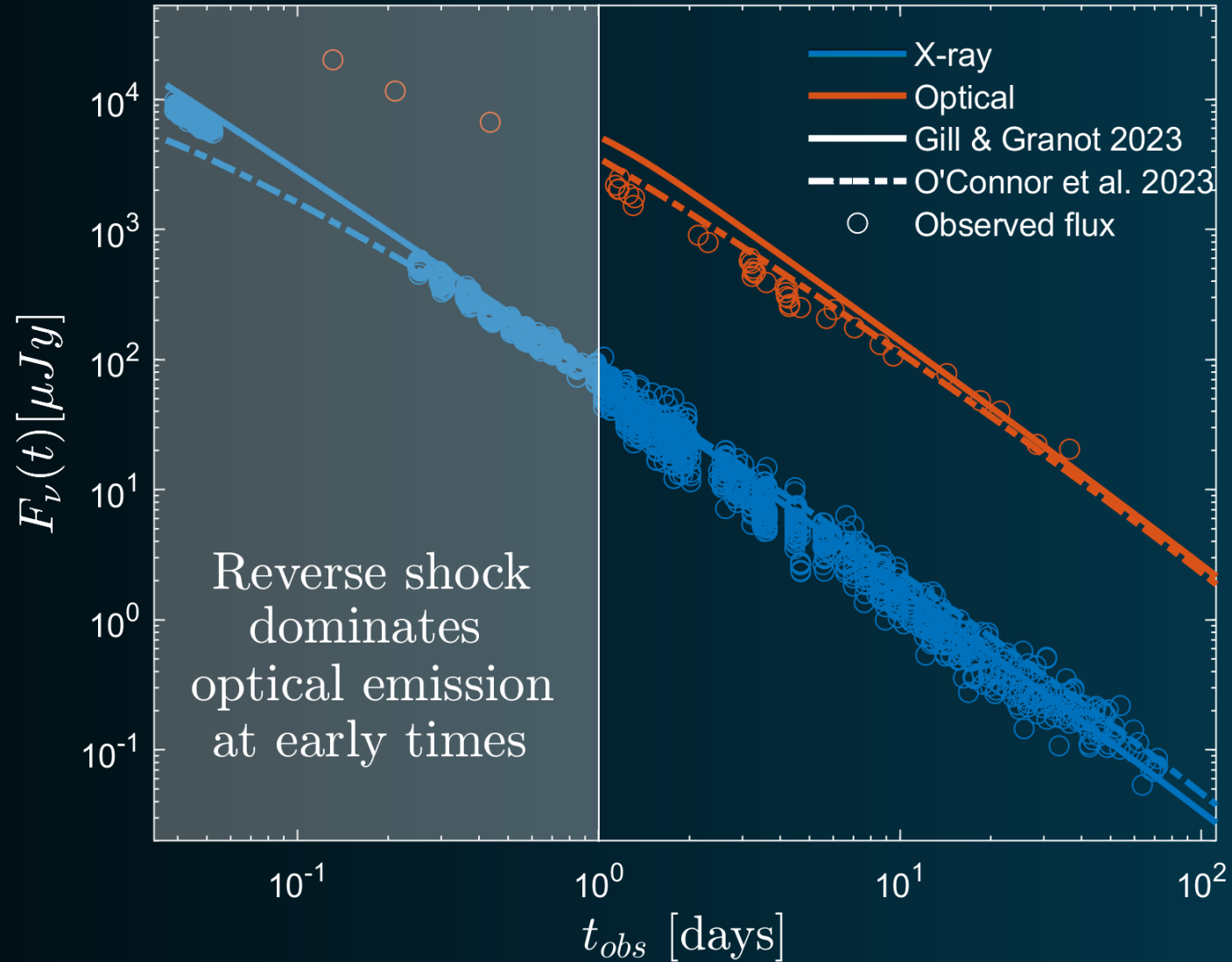


GRB 221009A



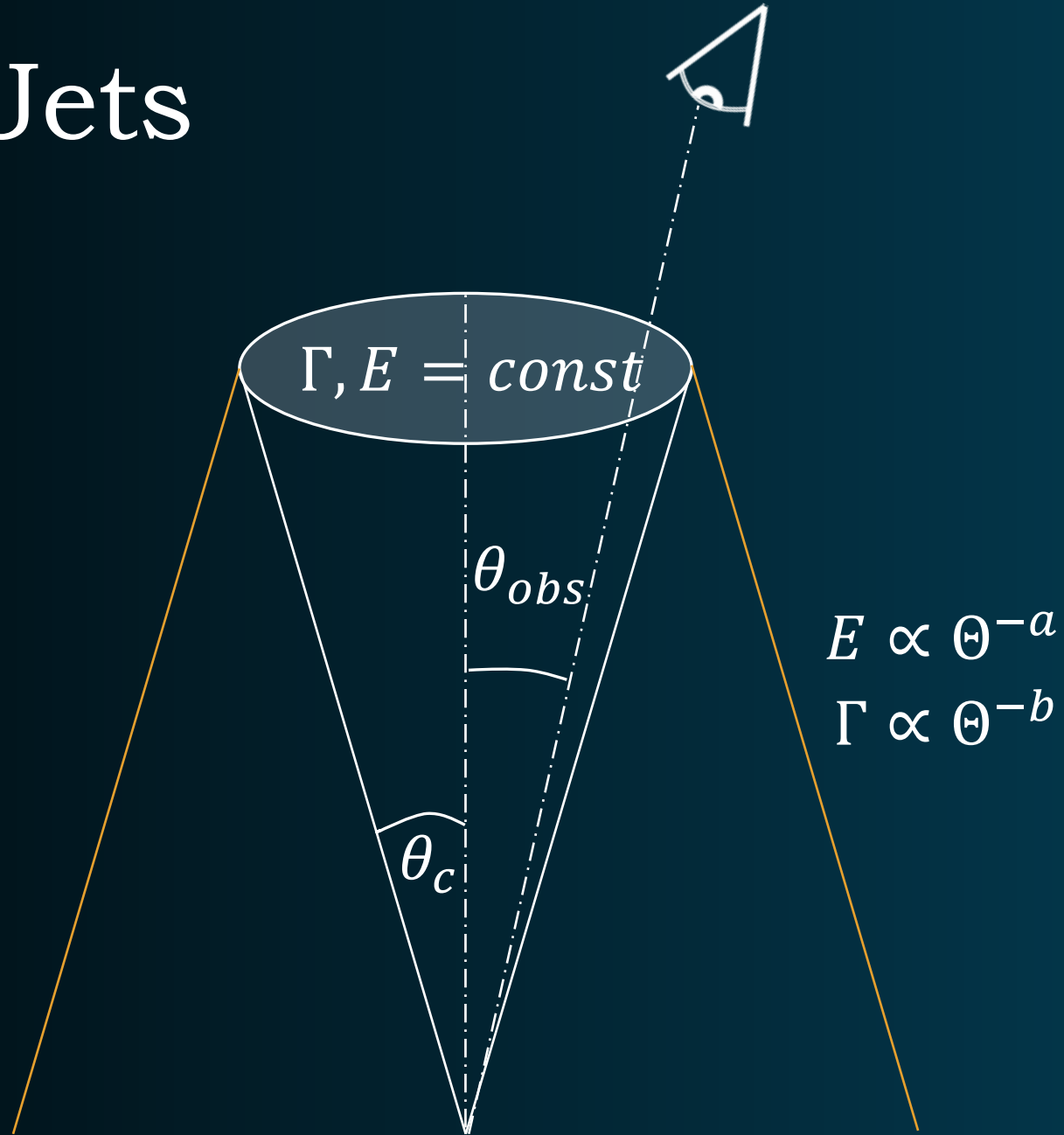
Different Structures
Can Fit the Light Curve!

GRB 221009A

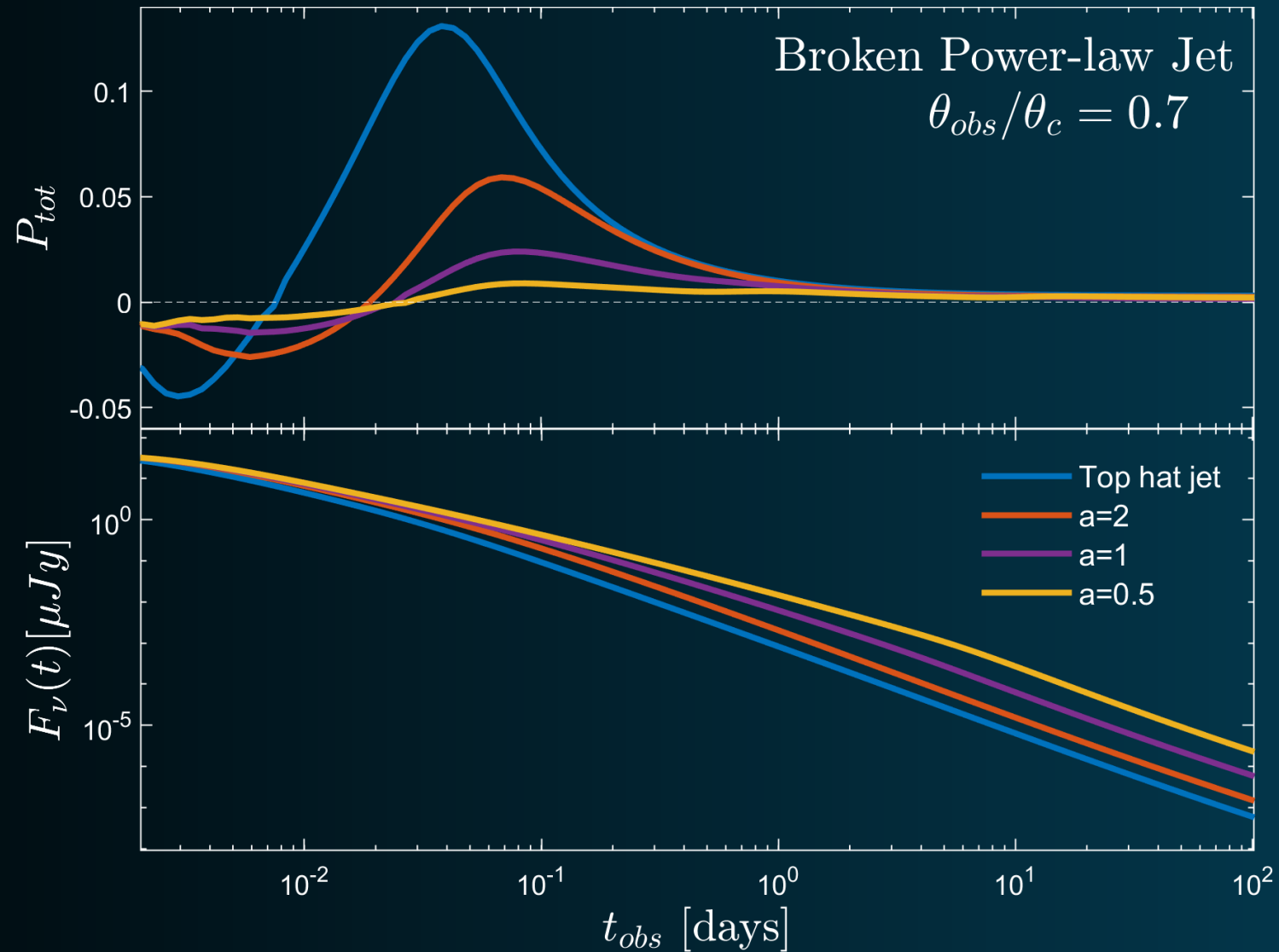


Linear Polarization Can
Differentiate Between
Structures!

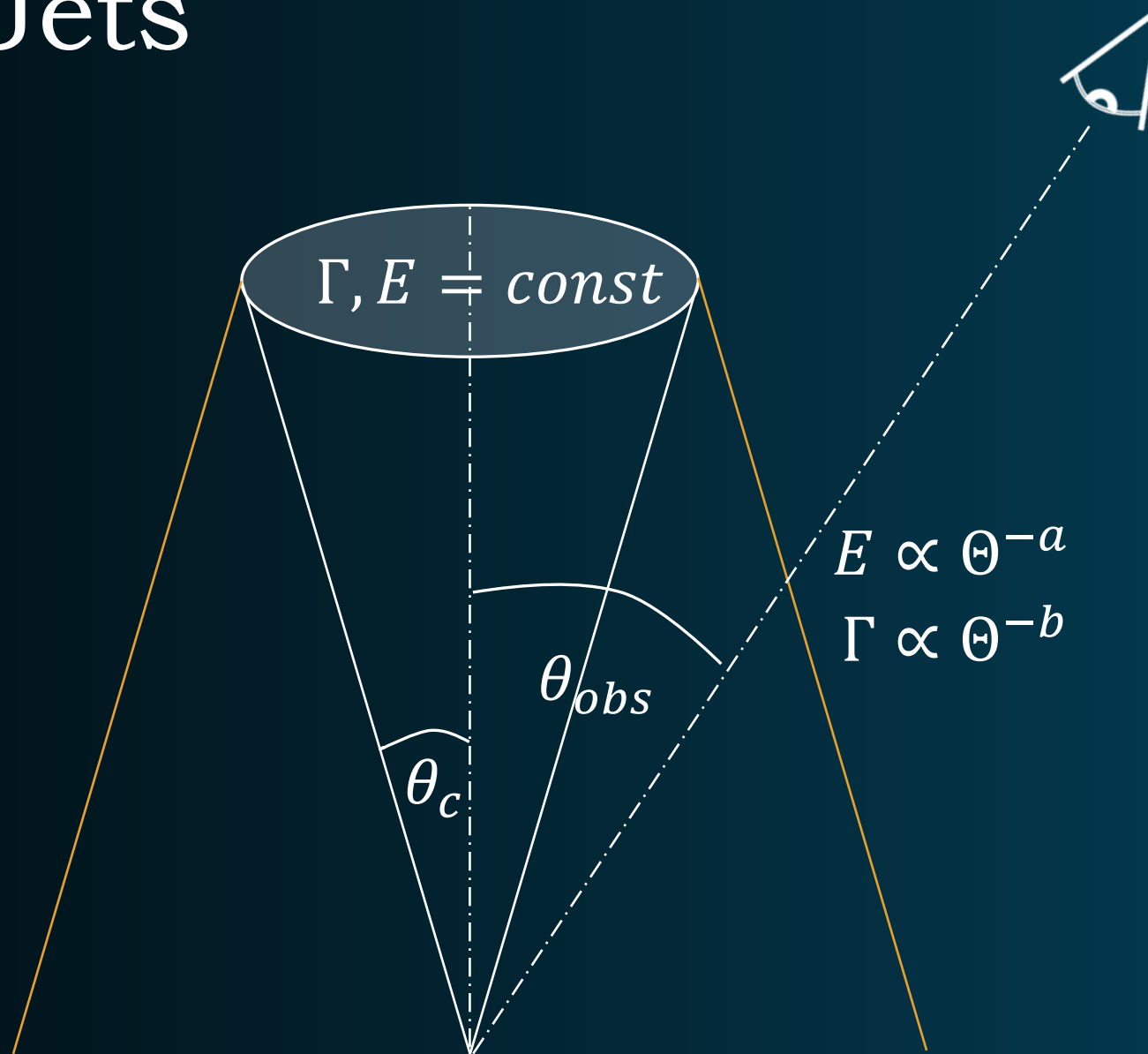
On-axis Jets



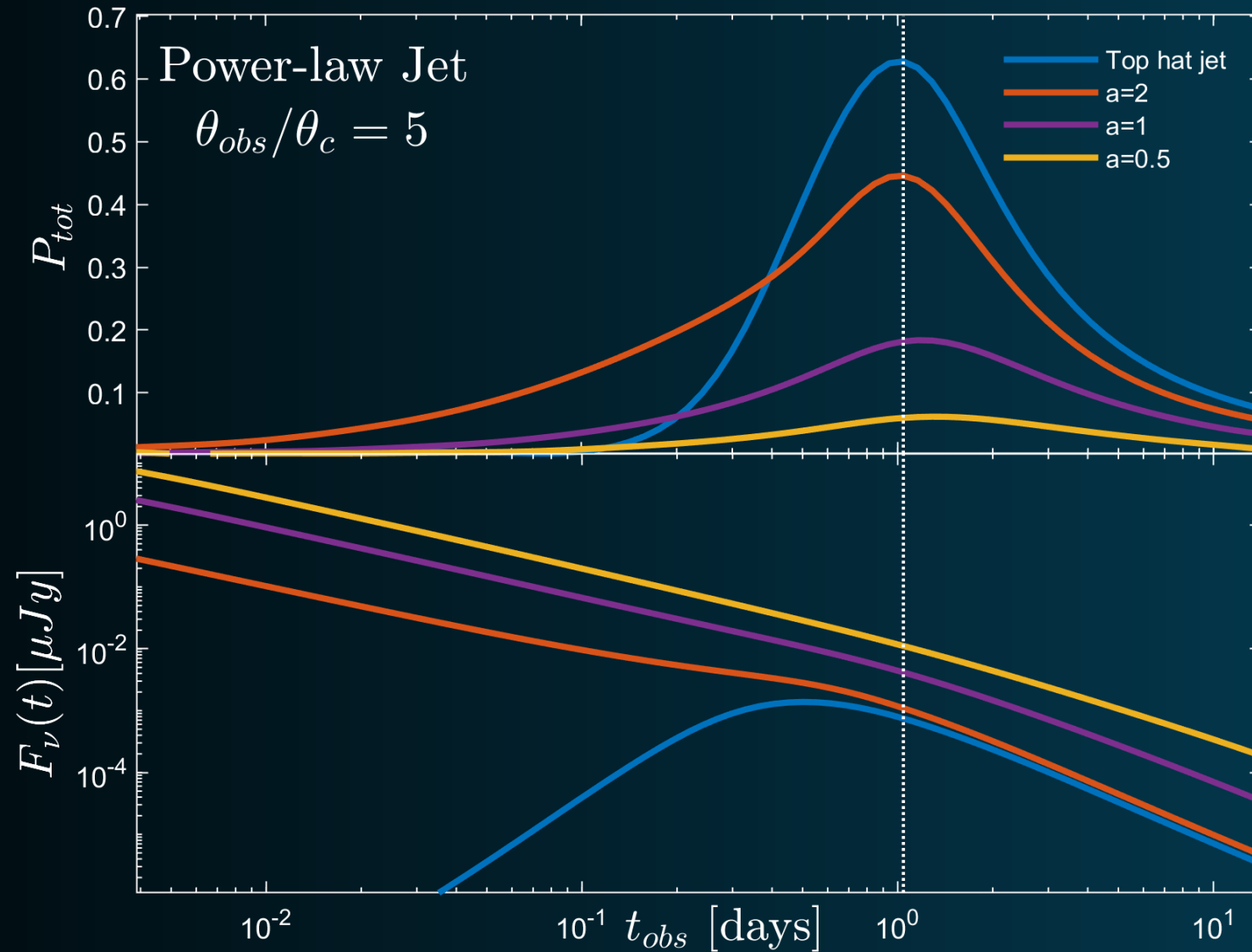
On-axis Jets



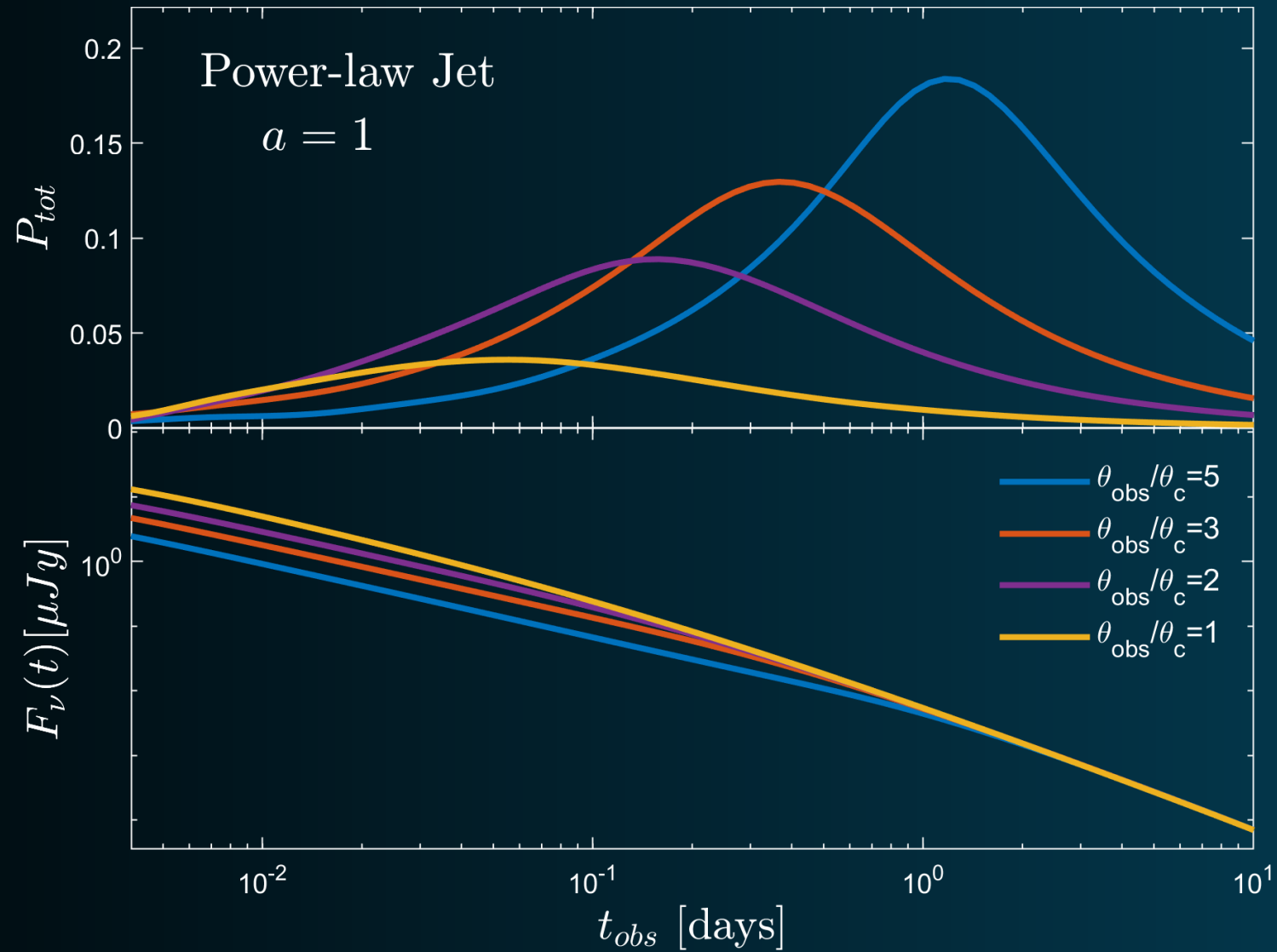
Off-axis Jets



Off-axis Jets

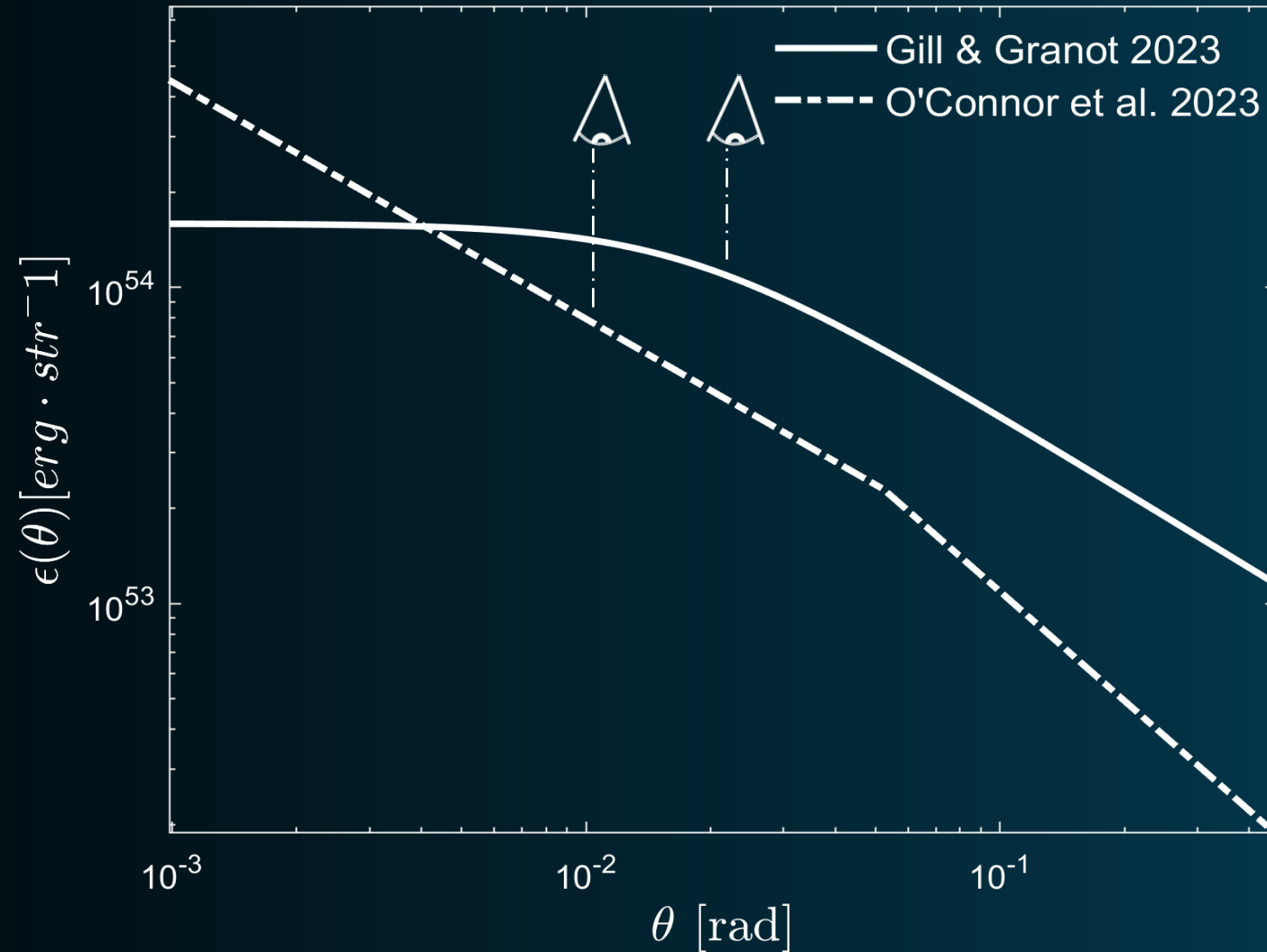


Off-axis Jets

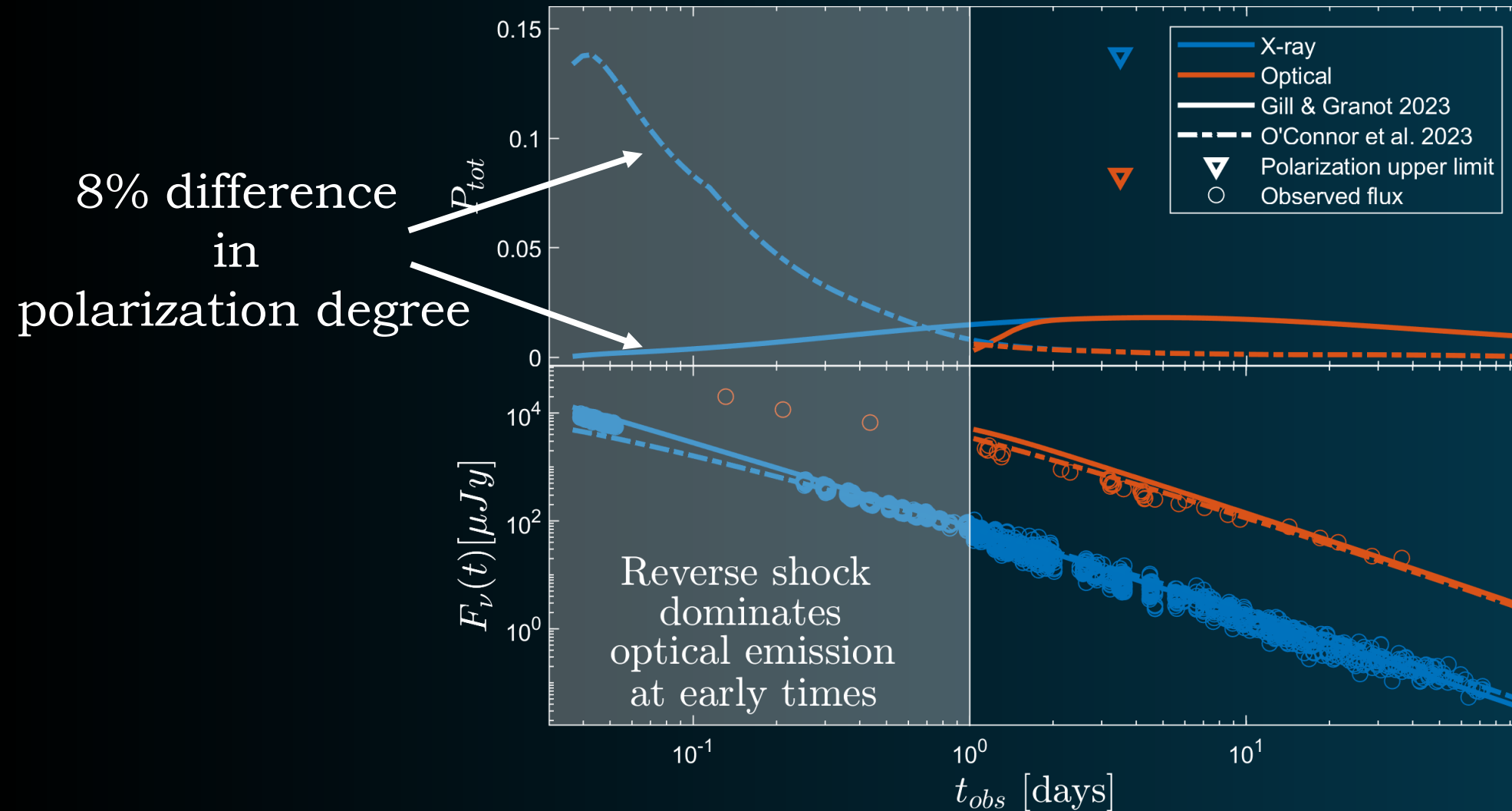


Let's Go Back To
GRB 221009A

GRB 221009A



GRB 221009A



Takeaway Points

- Understanding the structure of the jet can help us learn what processes it underwent before breaking out.
- Light curves alone cannot sample the jet structure as different structures can fit the same data.
- The polarization maximum is associated with a light curve break in both on axis and off axis jets.
- Adding a shallow structure to jet models decreases polarization which may explain observations better.
- The linear polarization signature of GRB AGs is sensitive to emission region geometry, which can help us discern between different models.