Gamma Ray Bursts

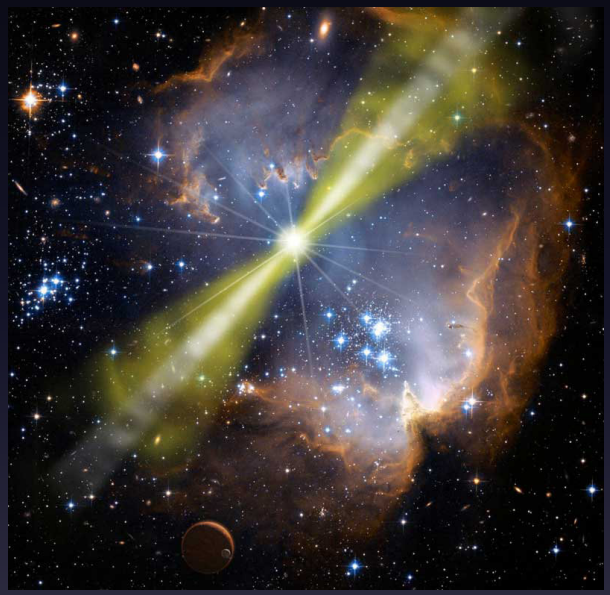
H.E.C.R.s and beam-plasma instability theory
A short introduction

Juan Carlos Tello

Instituto de Astrofísica de Andalucía (I.A.A.-C.S.I.C)

October 05, 2011

Introduction



GRBs Brief Description

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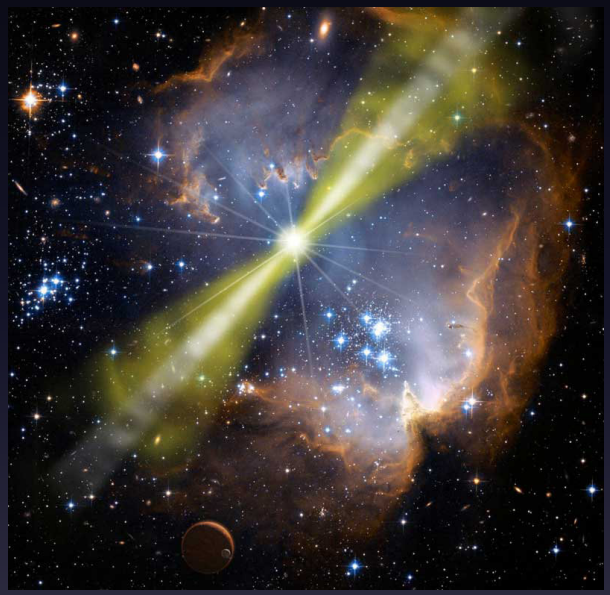

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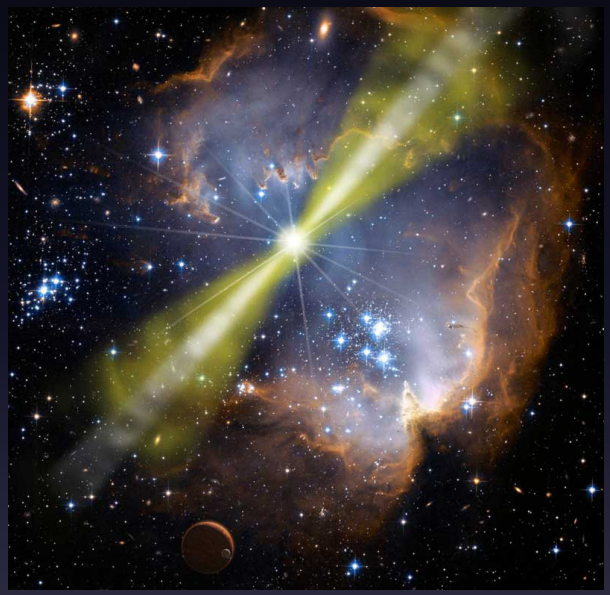

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- $E_{tot} \approx 10^{51} - 10^{54} ergs$

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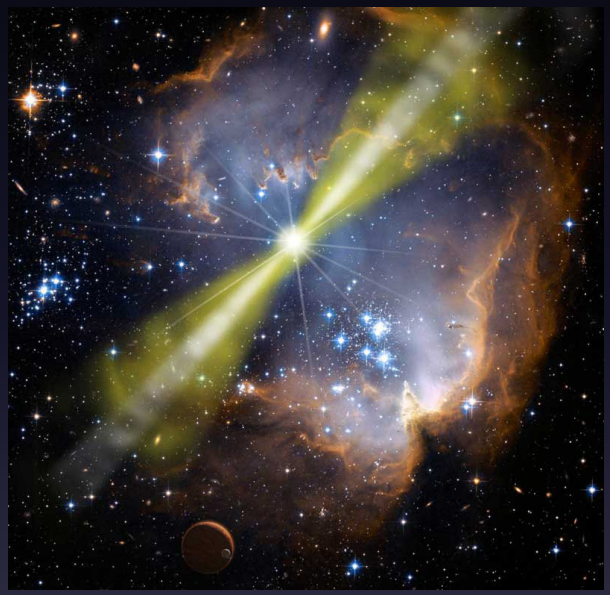

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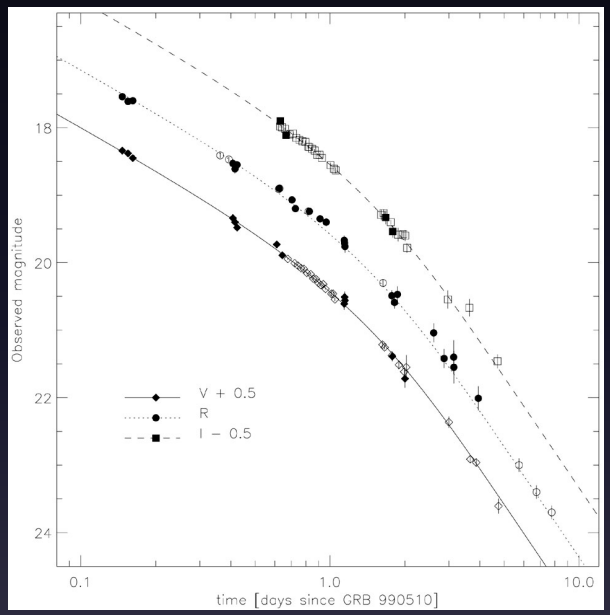

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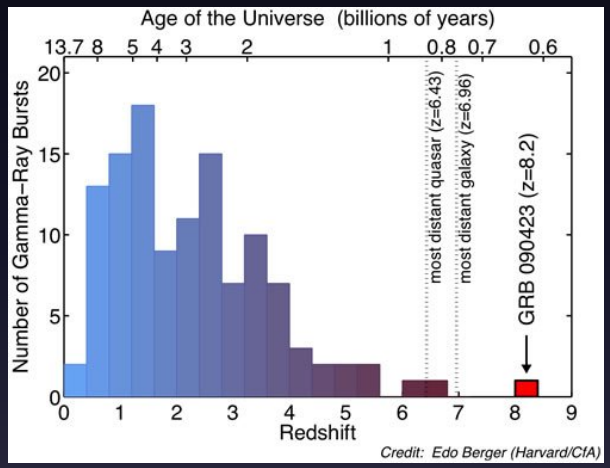

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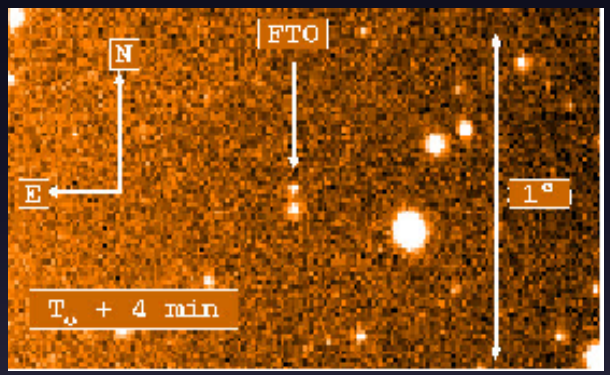

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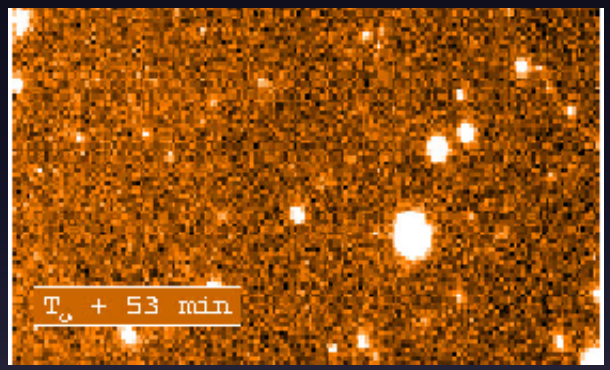

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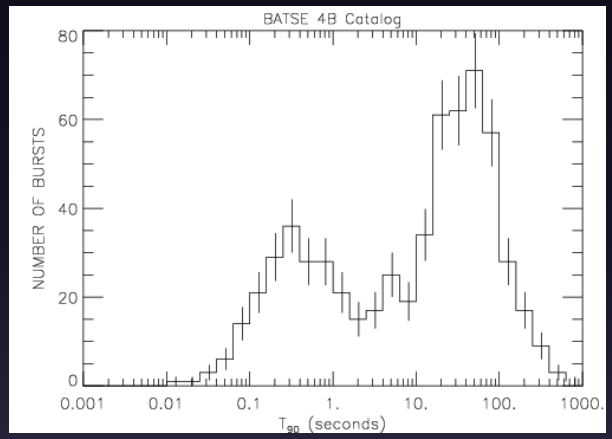

GRBs Brief Description (cont.)

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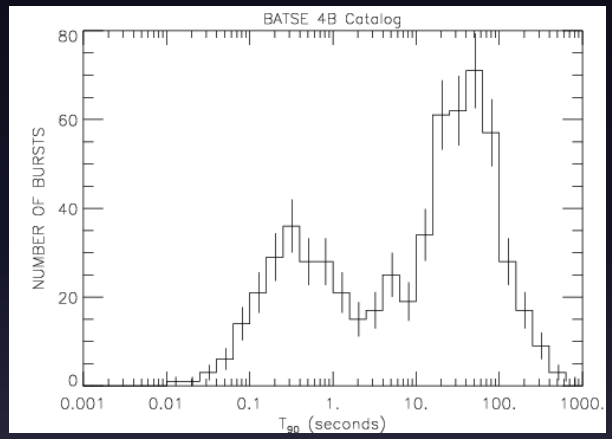

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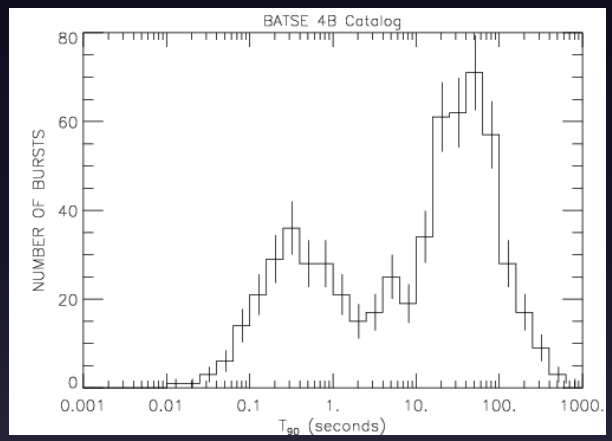

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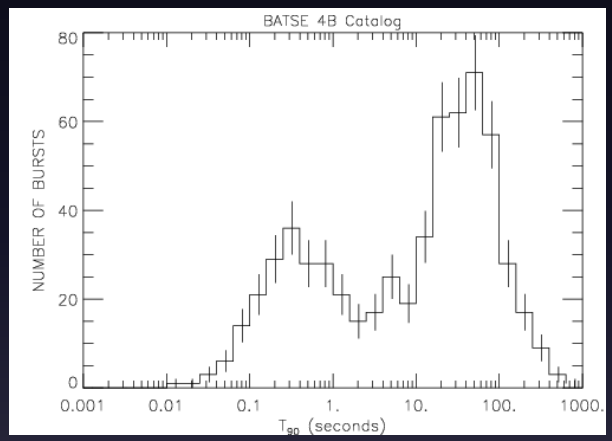

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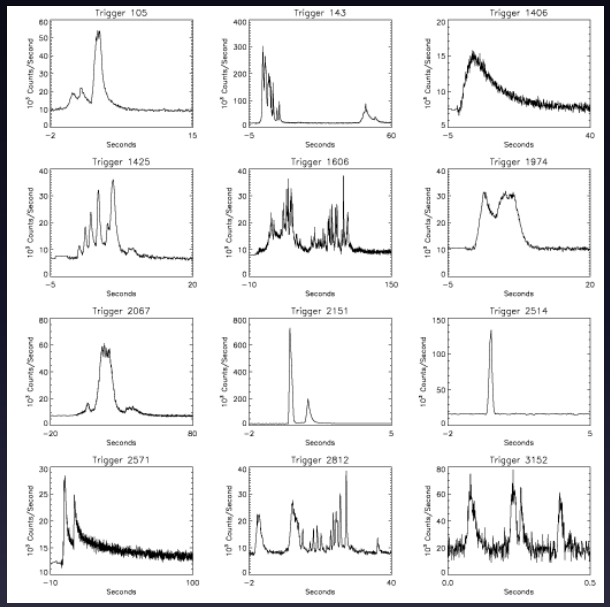

GRBs Brief Description (cont.)

- Classified by duration
  - Long GRBs: Hypernovae
  - Short GRBs: compact mergers
- Very varied light curves

GRB observation

GRB observation

- Detection

GRB observation

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  - *Swift*, *Fermi*

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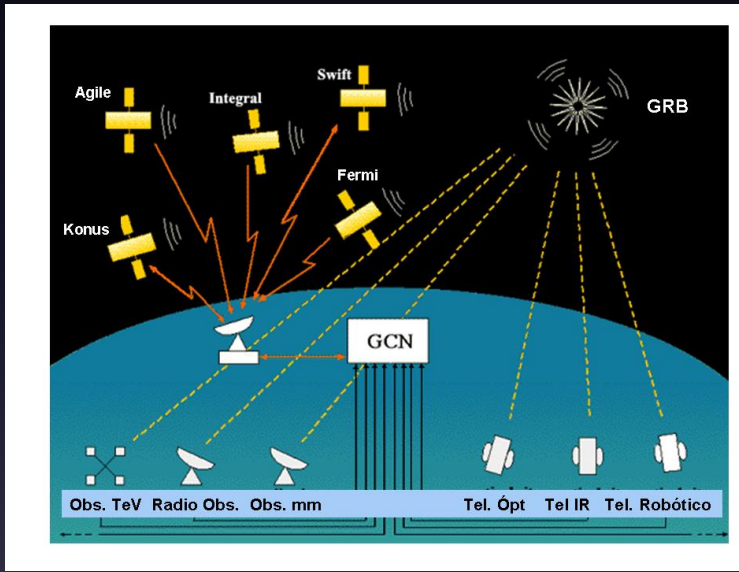

GRB observation

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  - *Swift*, *Fermi*
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  - Interplanetary Network (IPN)
  - Ground efforts
- Alert sent by G.C.N.
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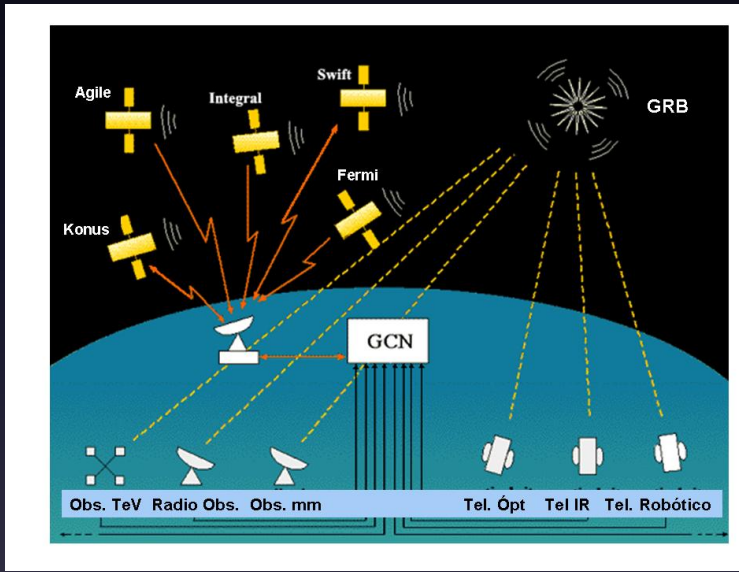

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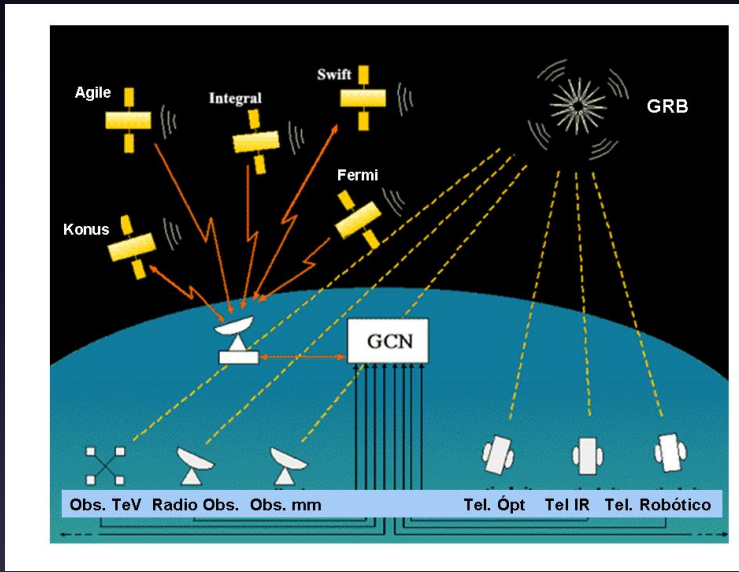

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- Observed from ground
  - Fast Robotic telescopes
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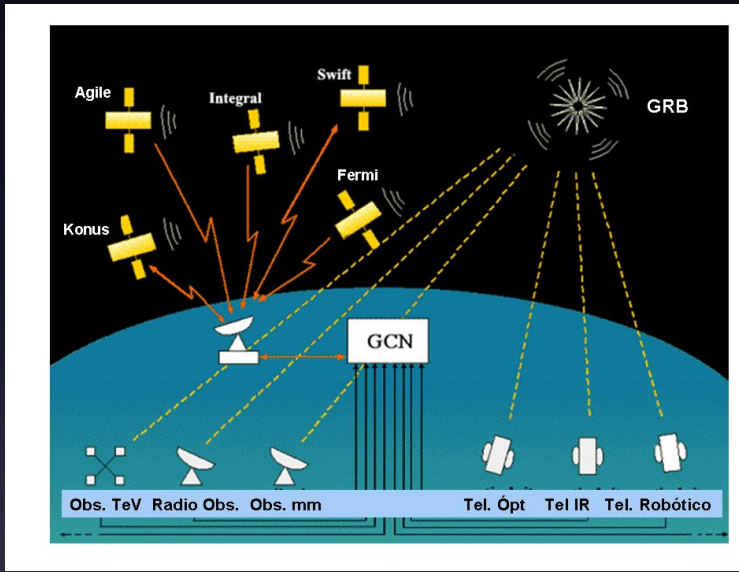

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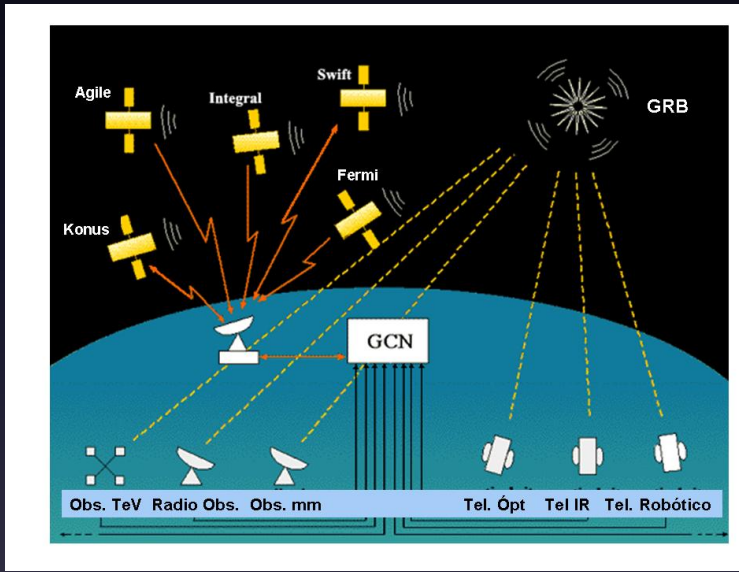
- Observed from ground
  - Fast Robotic telescopes
  - Large observatories
    - Optical



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    - Optical
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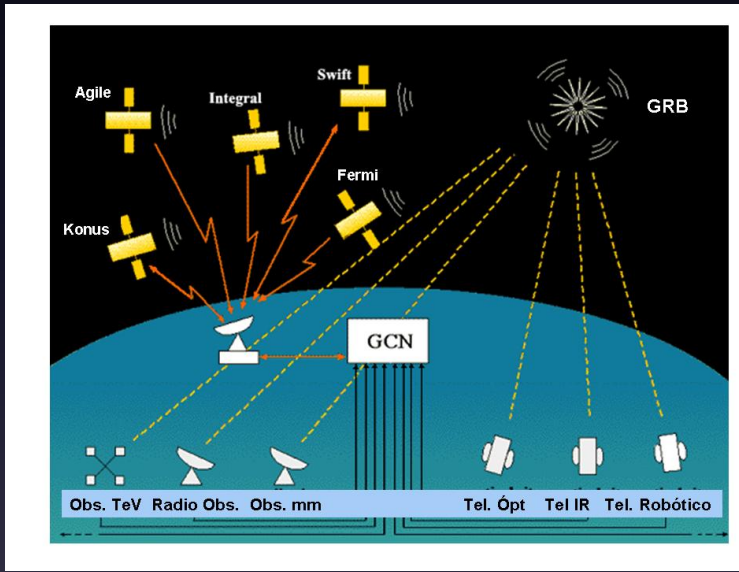

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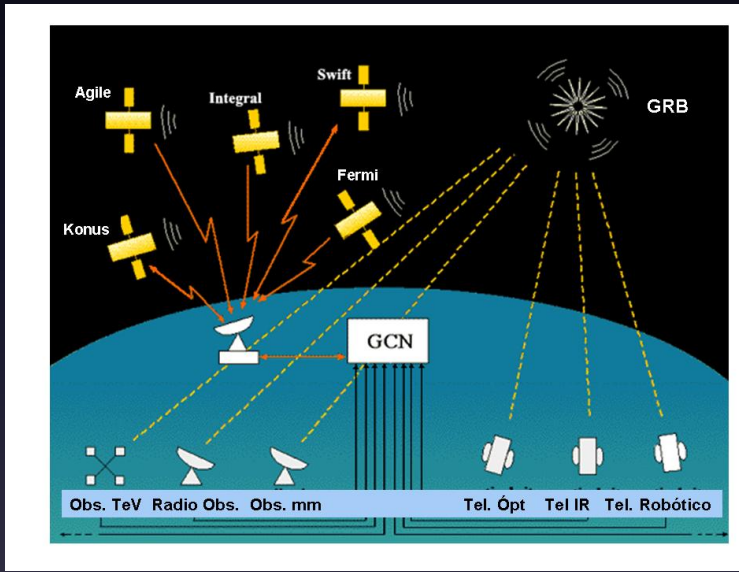
  - Large observatories
    - Optical
    - Radio
    - Air showers



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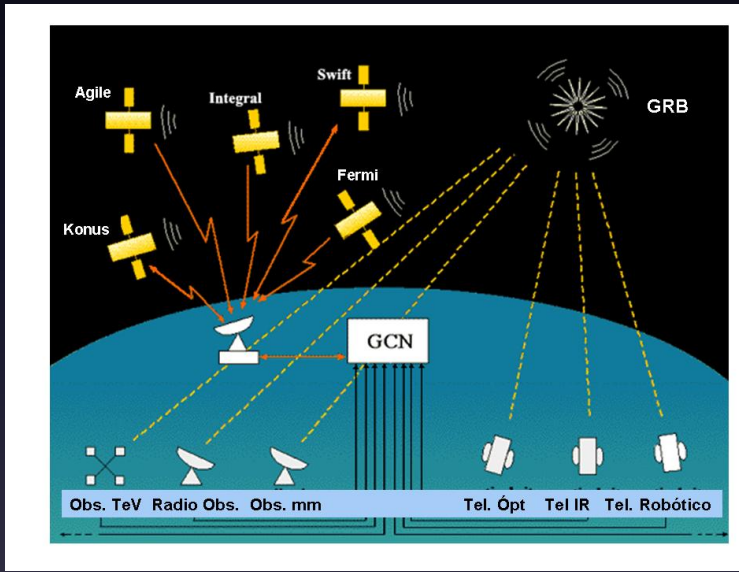
    - Optical
    - Radio
    - Air showers
    - Neutrinos, Gravitational waves



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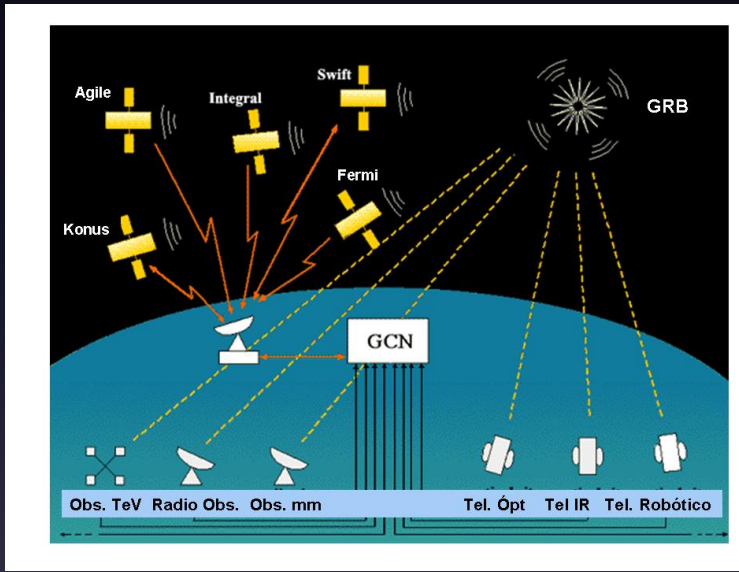
  - Fast Robotic telescopes
  - Large observatories
    - Optical
    - Radio
    - Air showers
    - Neutrinos, Gravitational waves
- and other satellites



Burst Optical Observer and Transient Exploring System (**B.O.O.T.E.S.**)

BOOTES Homepage

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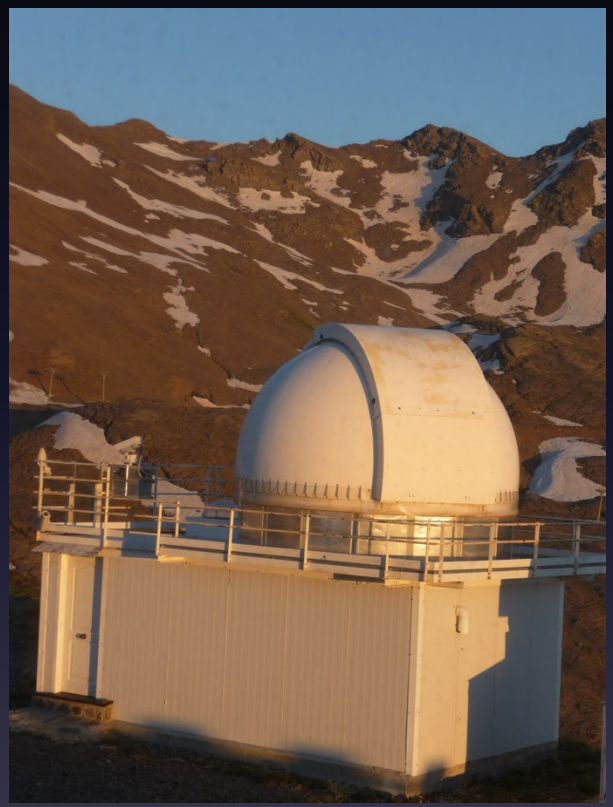

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BOOTES-3 status

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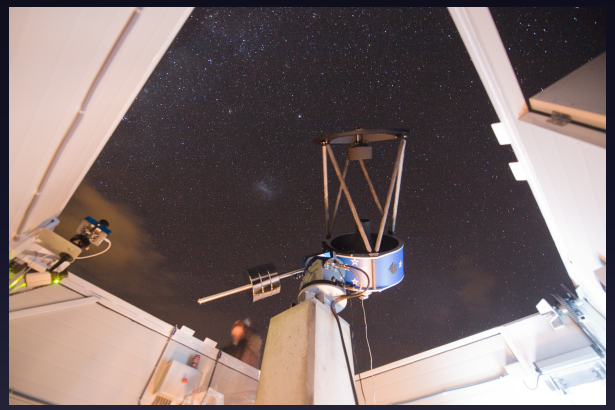

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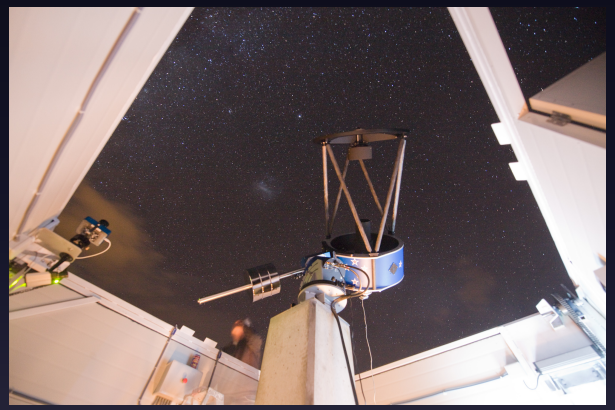
- BOOTES-4: Siberia



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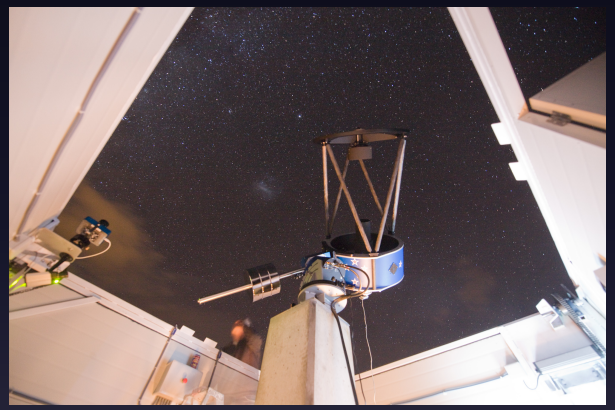

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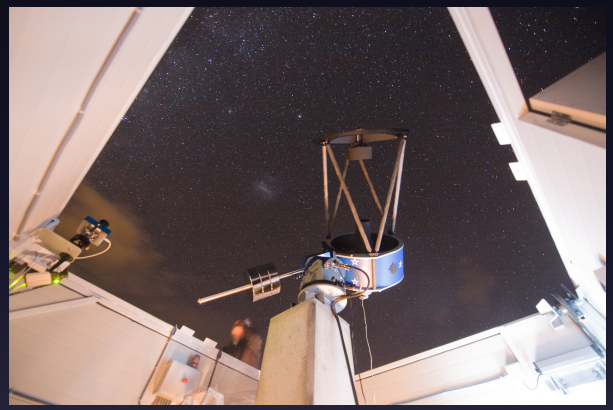
- More in the future?



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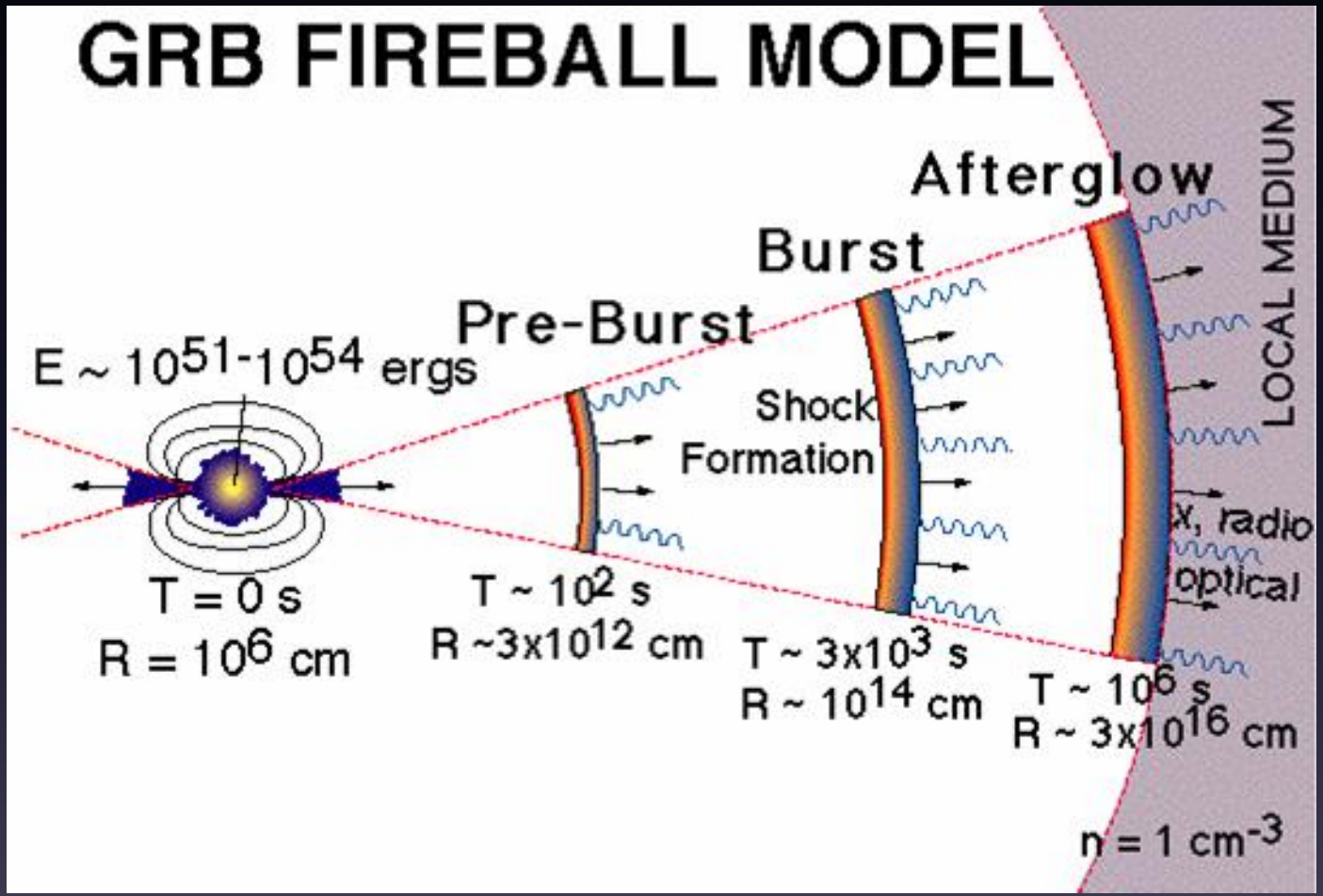
Emission mechanism



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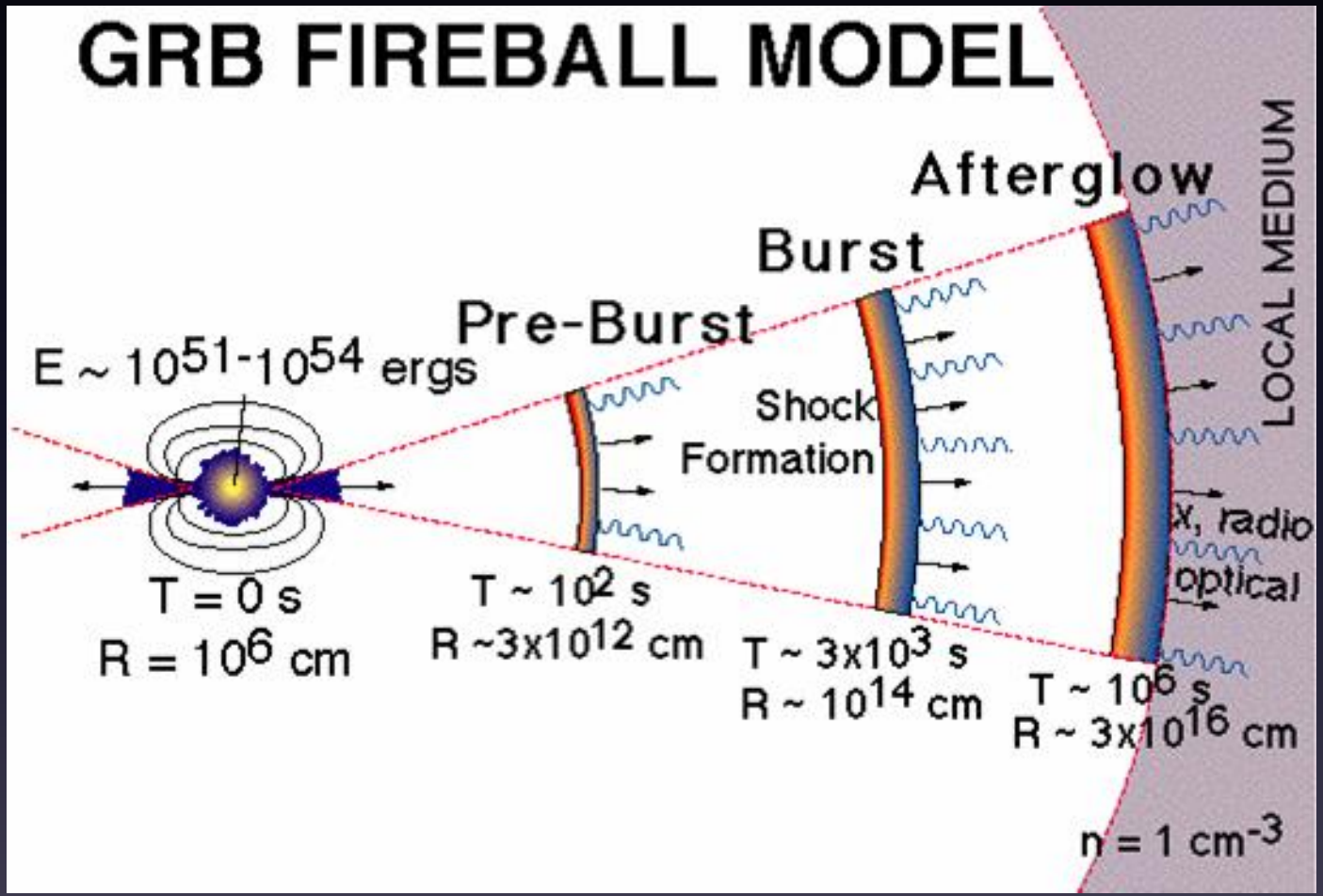

Fermi acceleration

G.R.B.s, H.E.C.R.s and Beam-Plasma Instabilities

My understanding of what Antoine Bret's talk will cover:

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- Collisionless shocks

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- Collisionless shocks
- Beam-Plasma Instabilities
- Considerations for their proper simulation
- Interesting results

Questions?

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Thanks

Credits

By order of appearance

- Beamer "keynote" template by Shawn Lankton
- Artist conception of GRB 080319B
  Credit: NASA/Swift/Mary Pat Hrybyk-Keith and John Jones
- The optical light curves of GRB 990510. [**?**].
- Distribution of redshifts Credit: Edo Berger (Harvard/CfA)
- GRB 000313 Afterglow detected by BOOTES [**?**]
- BATSE 4B Catalog duration histogram [**?**]
- Diversity of time profiles of GRBs [**?**]
- Artist's interpretation *Swift*, with a gamma-ray burst exploding behind. NASA/GSFC/Spectrum Astro.
- The physical GCN network
- GRB Fireball Model. Credit *Swift*/NASA

References

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