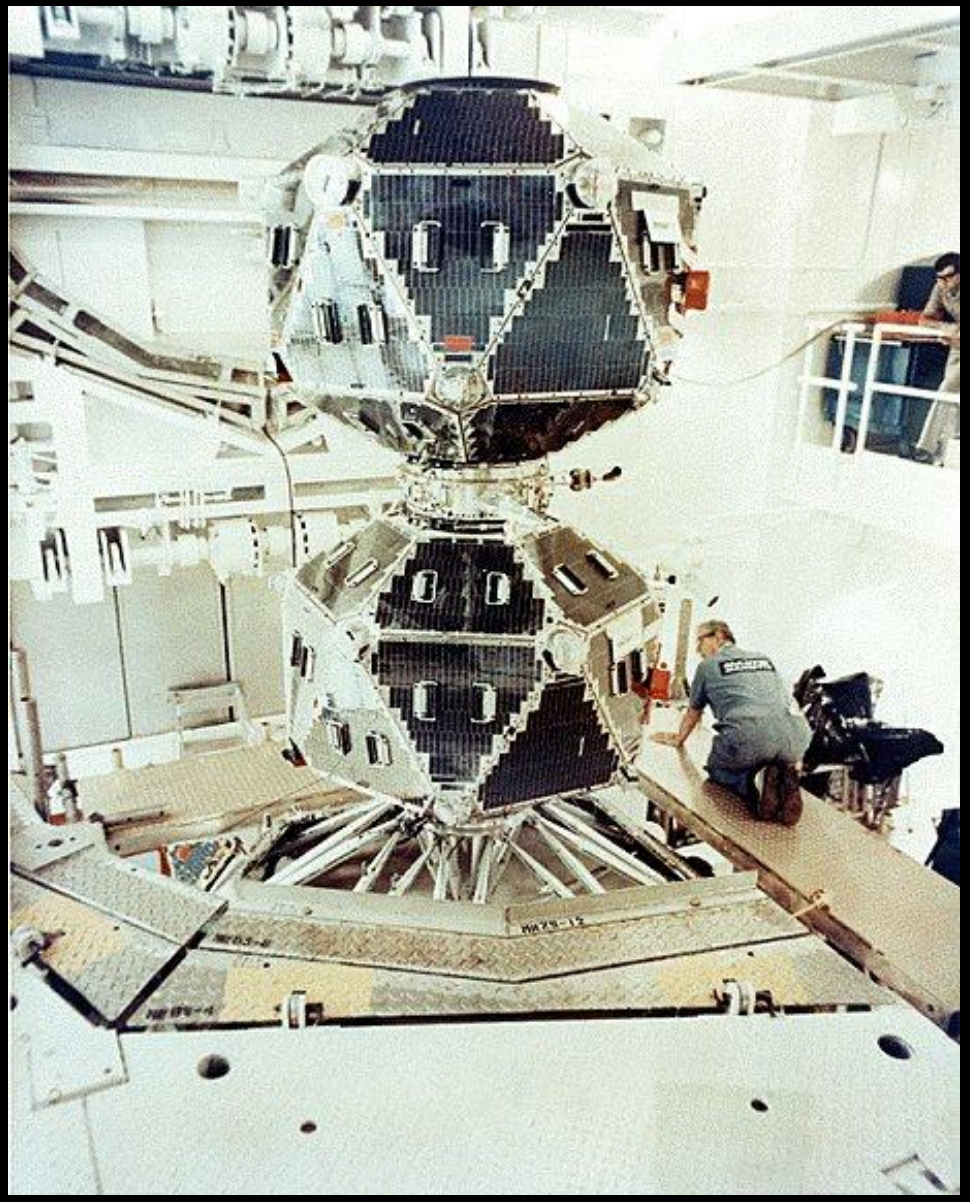
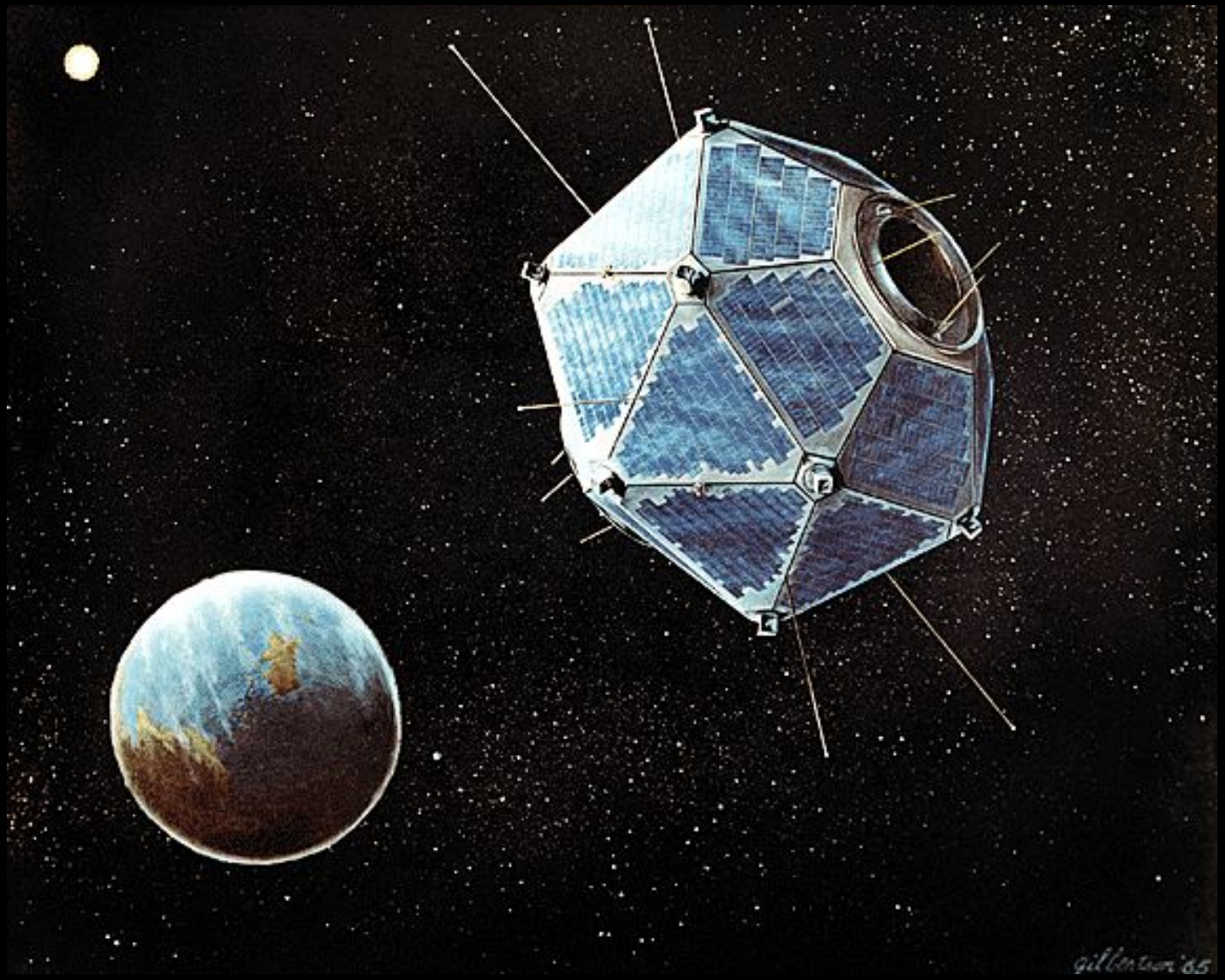
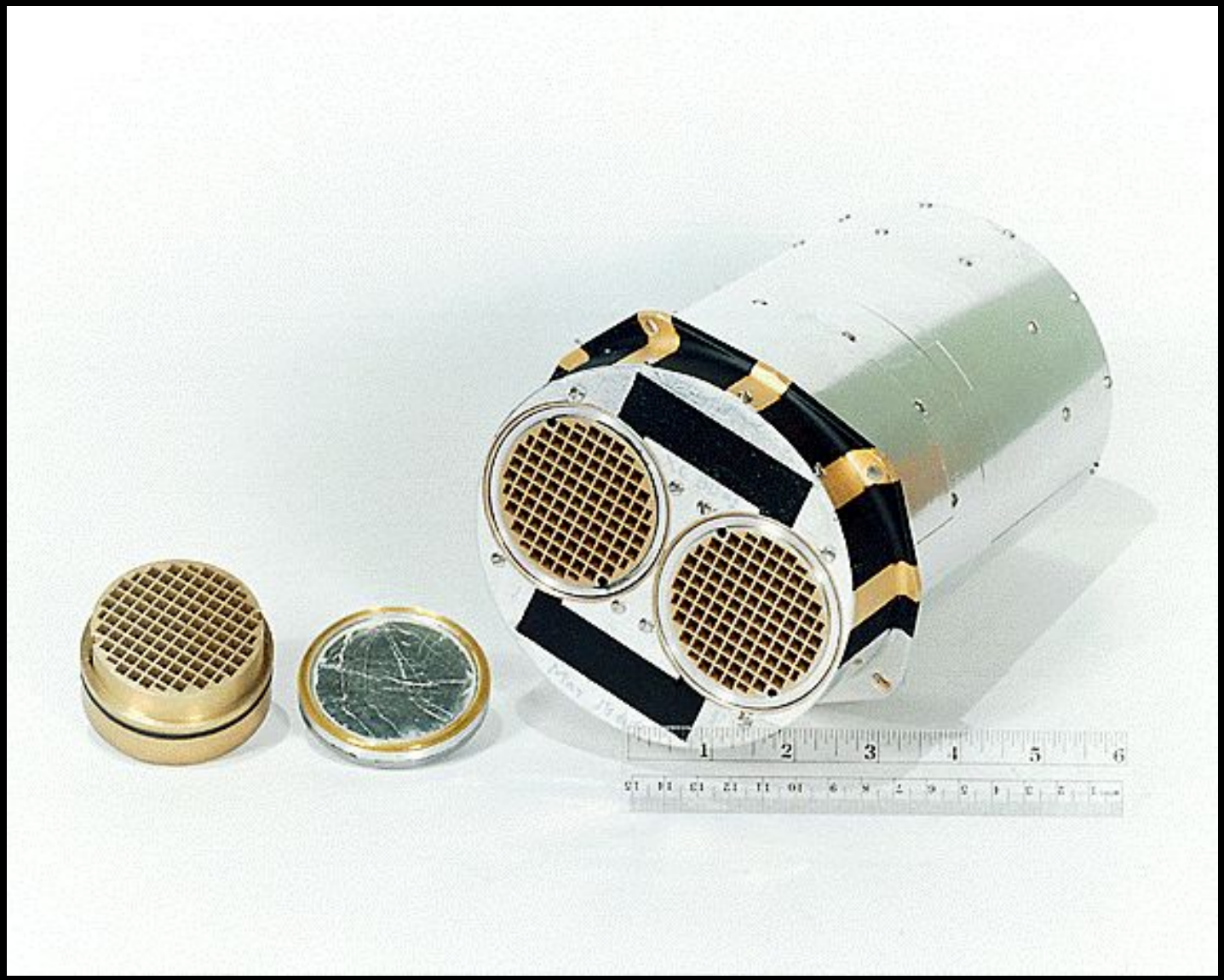
Гамма-всплески

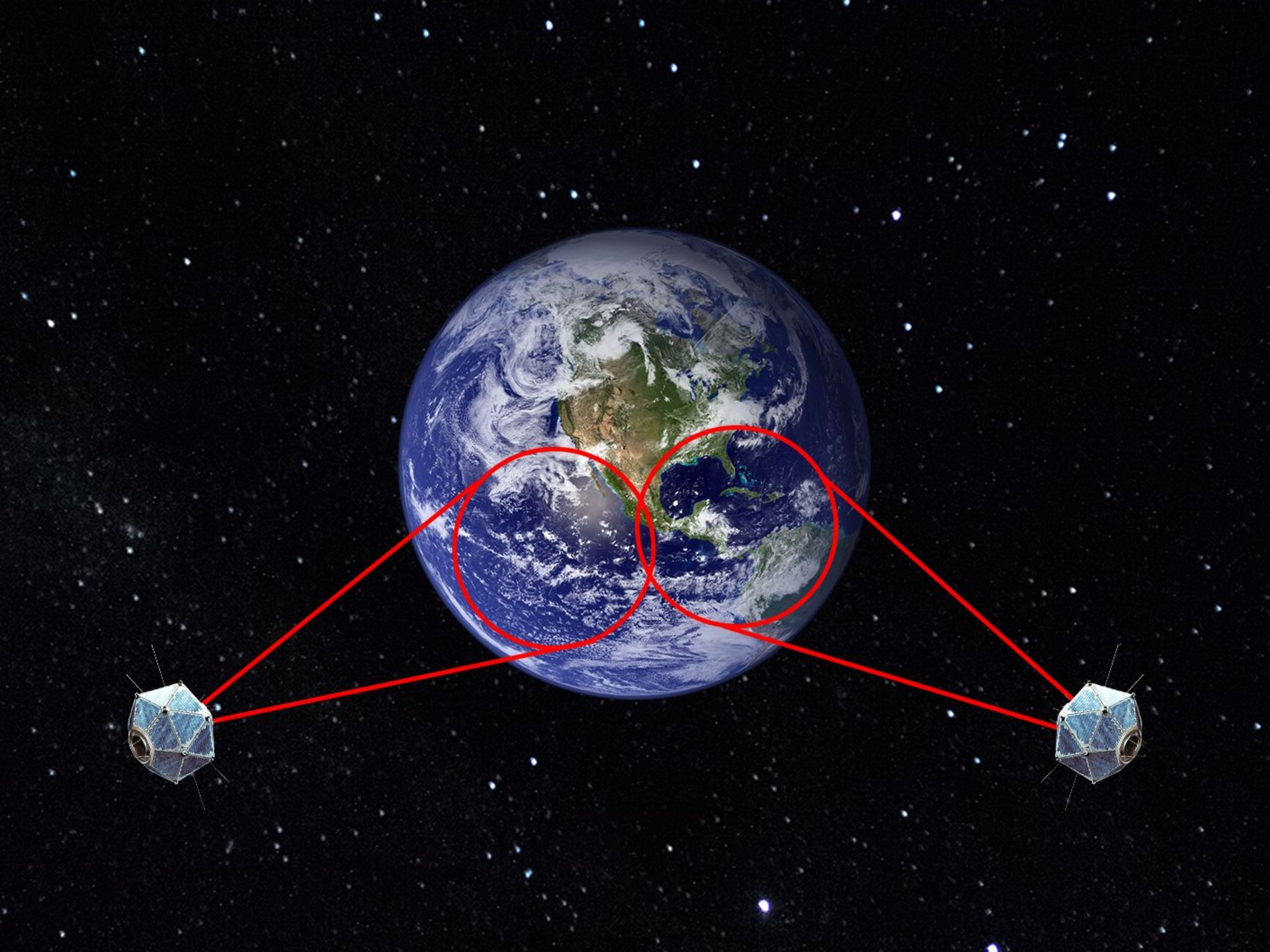
Vela 5a and 5b




gilbertson 65

Детектор – счетчик

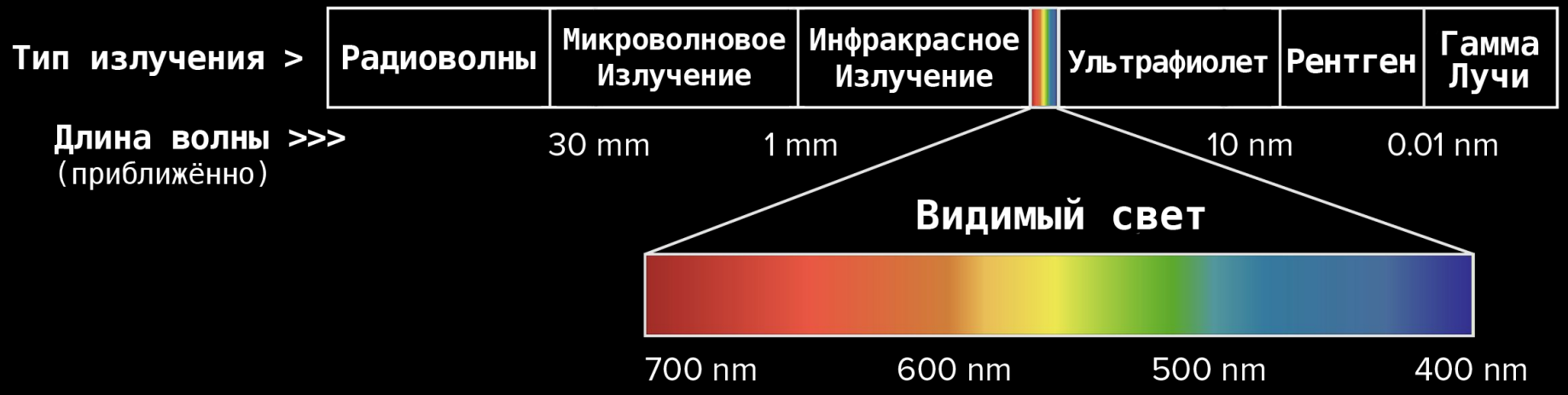




ЭЛЕКТРОМАГНИТНЫЙ СПЕКТР

Тип излучения >	Радиоволны	Микроволновое Излучение	Инфракрасное Излучение		Ультрафиолет	Рентген	Гамма Лучи
Длина волны >>> (приближённо)		30 mm	1 mm		10 nm		0.01 nm

ЭЛЕКТРОМАГНИТНЫЙ СПЕКТР



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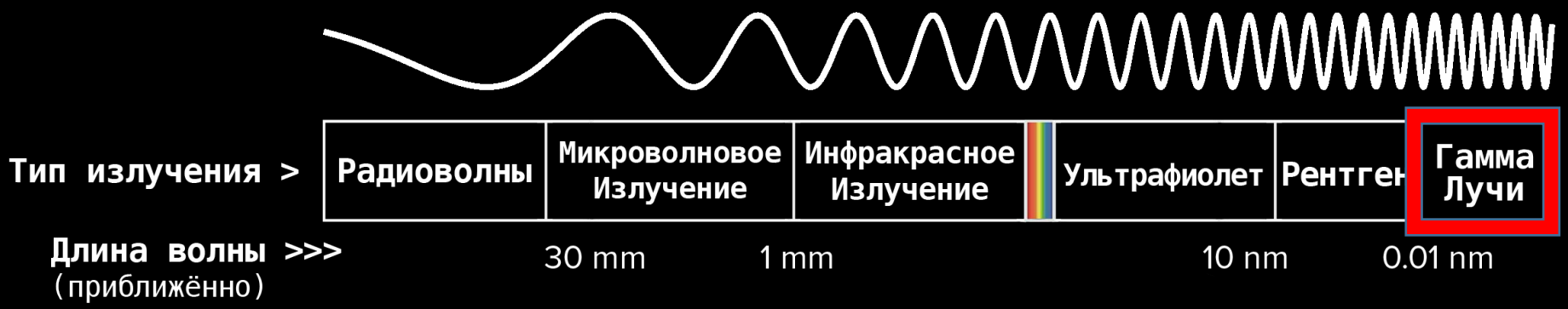
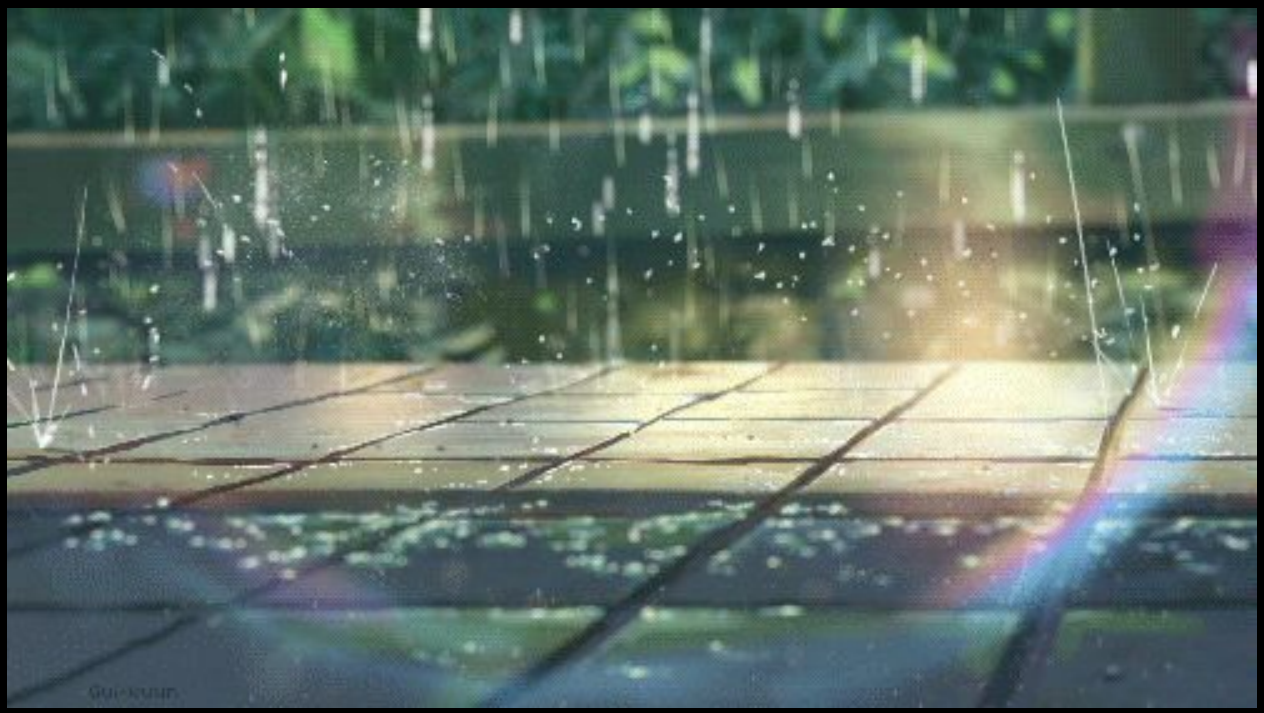
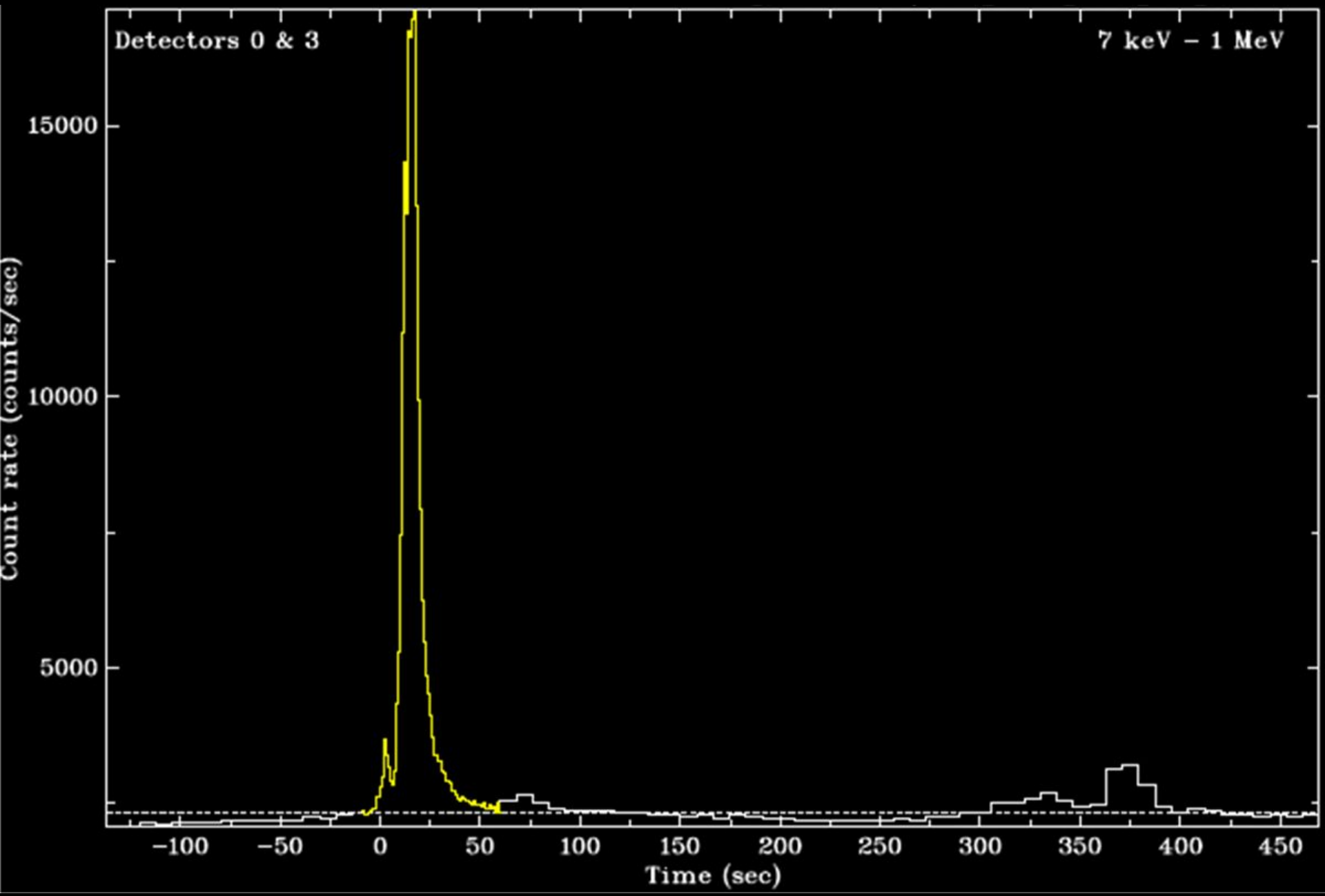
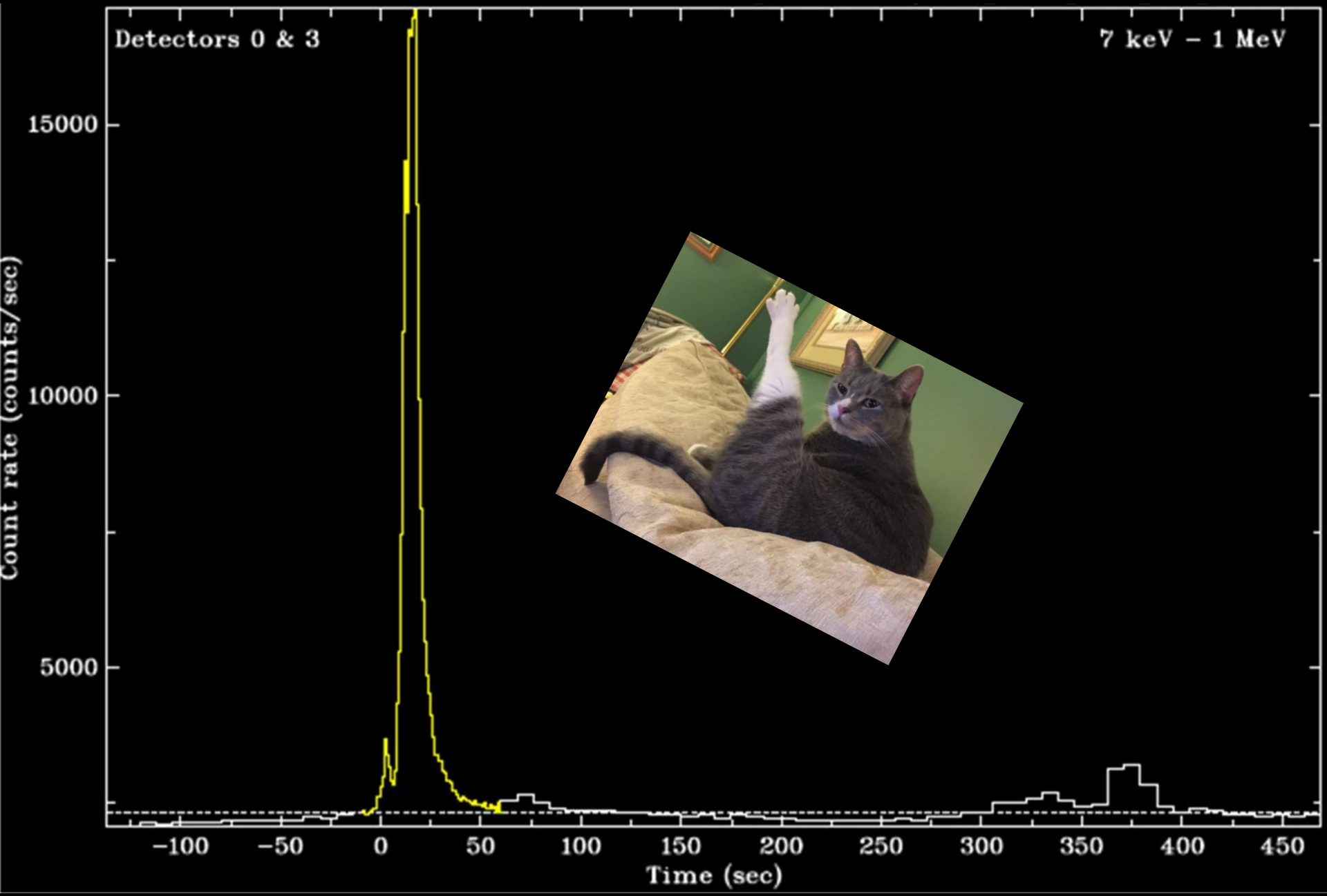


ГАММА ЛУЧИ (γ)

- высокая энергия
- длина волны 10^{-11} m




Detectors 0 & 3
7 keV – 1 MeV
15000
10000
5000
Count rate (counts/sec)
−100
−50
0
50
100
150
200
250
300
350
400
450
Time (sec)


Detectors 0 & 3
7 keV – 1 MeV
15000
10000
5000
Count rate (counts/sec)
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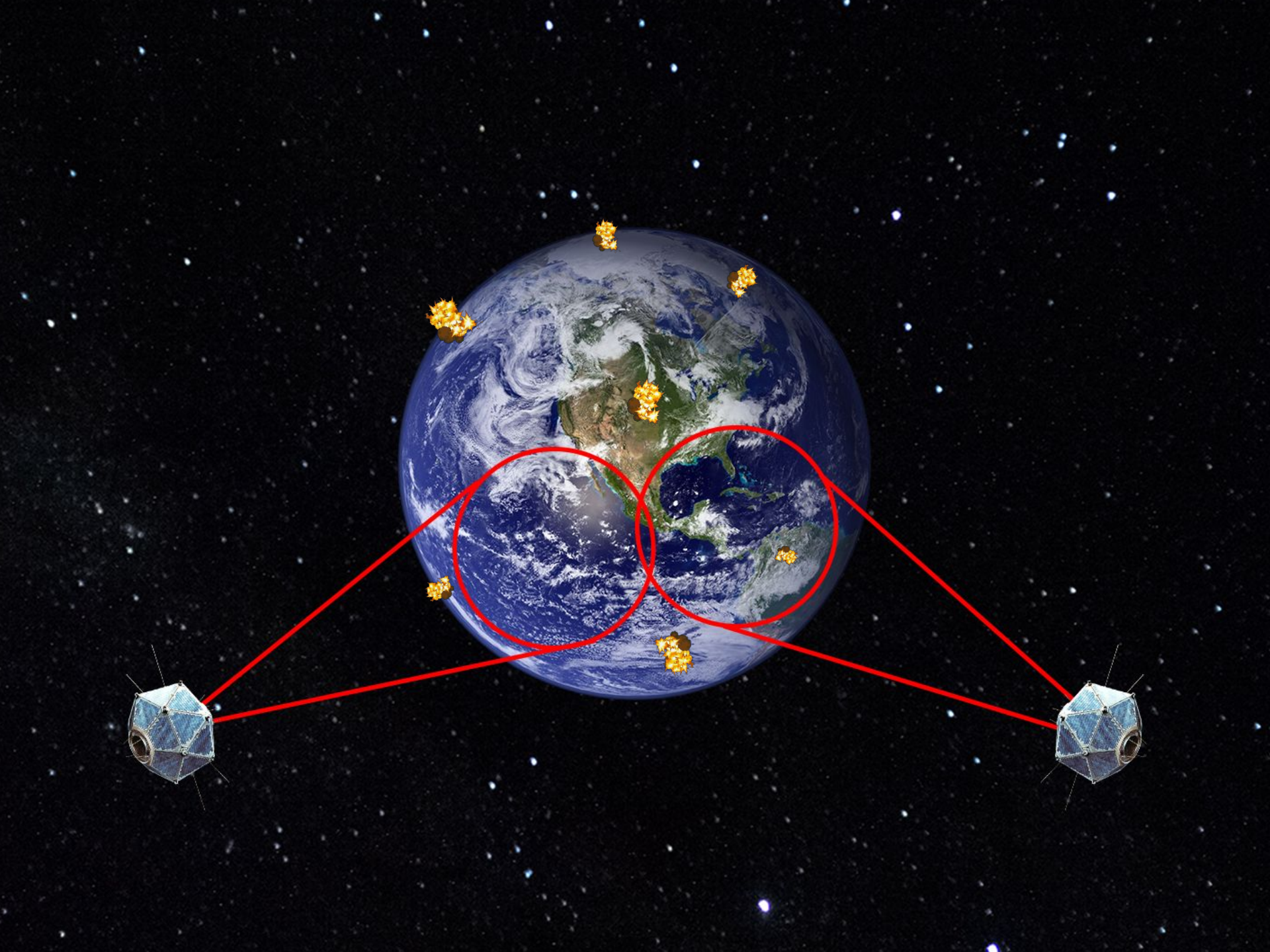
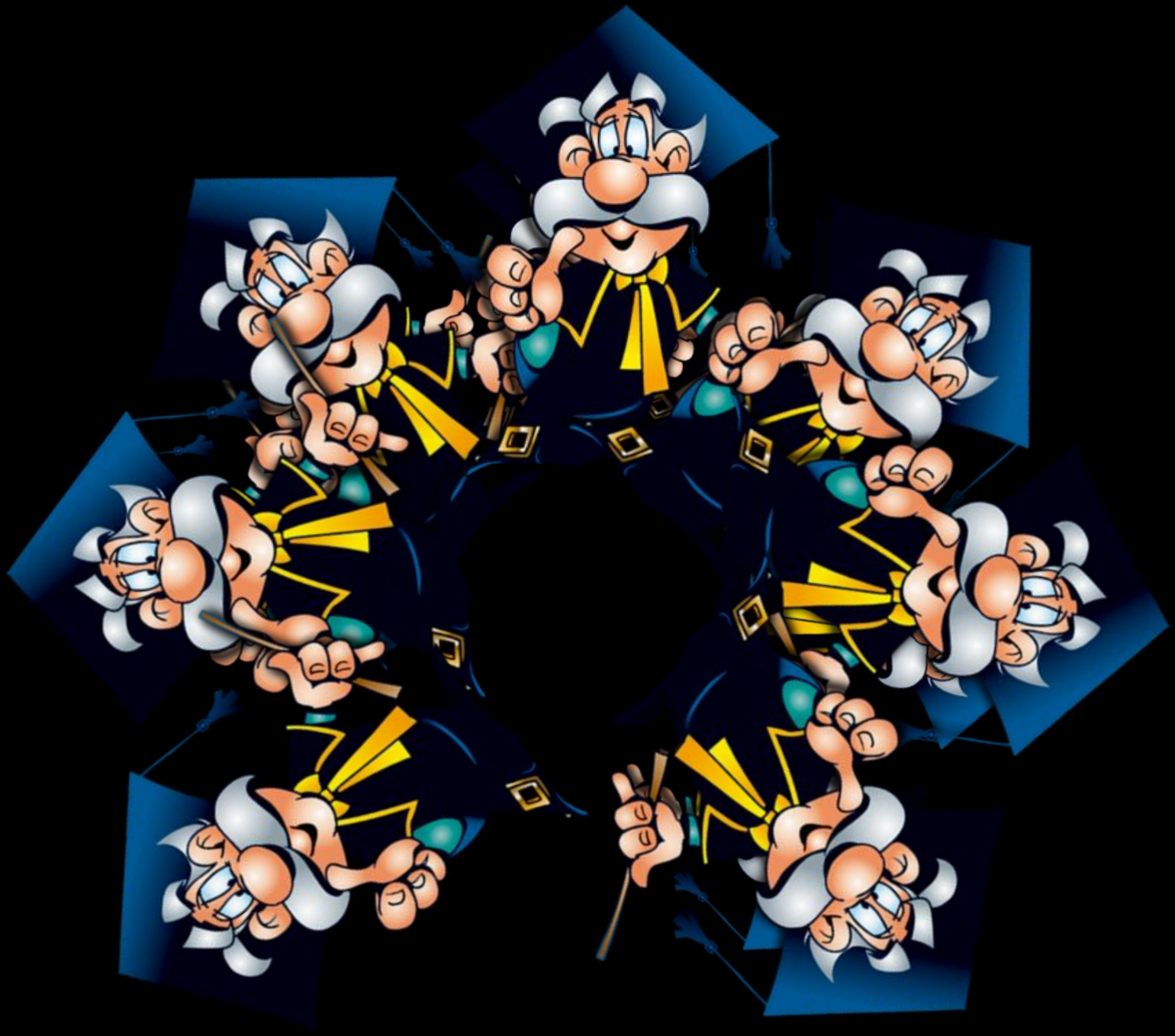
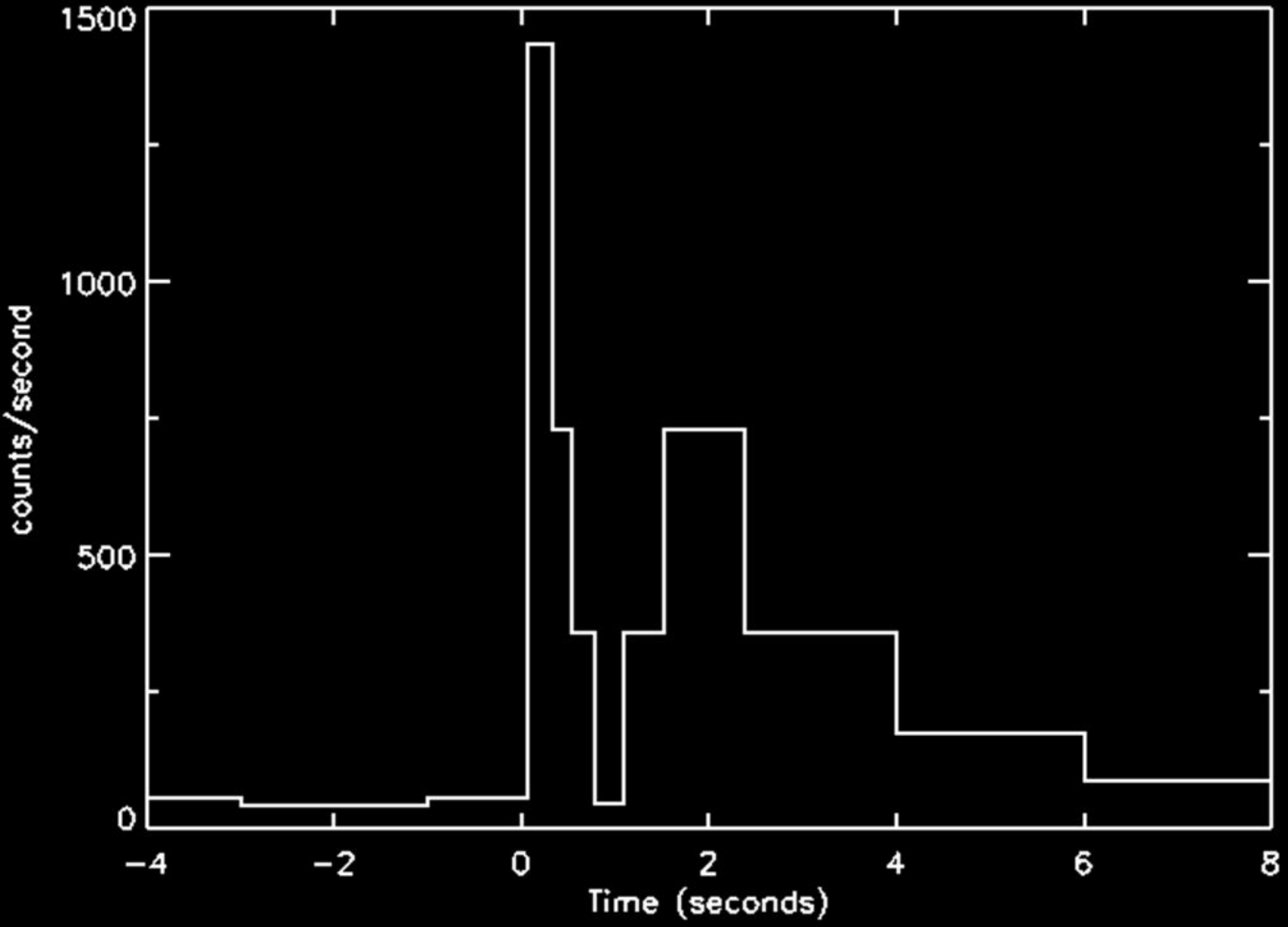
0
50
100
150
200
250
300
350
400
450
Time (sec)





Первый признанный гамма-всплеск



THE ASTROPHYSICAL JOURNAL, 182:L85–L88, 1973 June 1

OBSERVATIONS OF GAMMA-RAY BURSTS OF COSMIC ORIGIN

RAY W. KLEBESADEL, IAN B. STRONG, AND ROY A. OLSON

University of California, Los Alamos Scientific Laboratory, Los Alamos, New Mexico
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ABSTRACT

Sixteen short bursts of photons in the energy range 0.2–1.5 MeV have been observed between 1969 July and 1972 July using widely separated spacecraft. Burst durations ranged from less than 0.1 s to ~30 s, and time-integrated flux densities from $\sim 10^{-5}$ ergs cm^{-2} to $\sim 2 \times 10^{-4}$ ergs cm^{-2} in the energy range given. Significant time structure within bursts was observed. Directional information eliminates the Earth and Sun as sources.

Subject headings: gamma rays — X-rays — variable stars

I. INTRODUCTION

On several occasions in the past we have searched the records of data from early *Vela* spacecraft for indications of gamma-ray fluxes near the times of appearance of supernovae. These searches proved uniformly fruitless. Specific predictions of gamma-ray emission during the initial stages of the development of supernovae have since been made by Colgate (1968). Also, more recent Vela spacecraft are equipped with much improved instrumentation. This encouraged a more general search, not restricted to specific time periods. The search covered data acquired with almost continuous coverage between 1969 July and 1972 July, yielding records of 16 gamma-ray bursts distributed throughout that period. Search criteria and some characteristics of the bursts are given below.

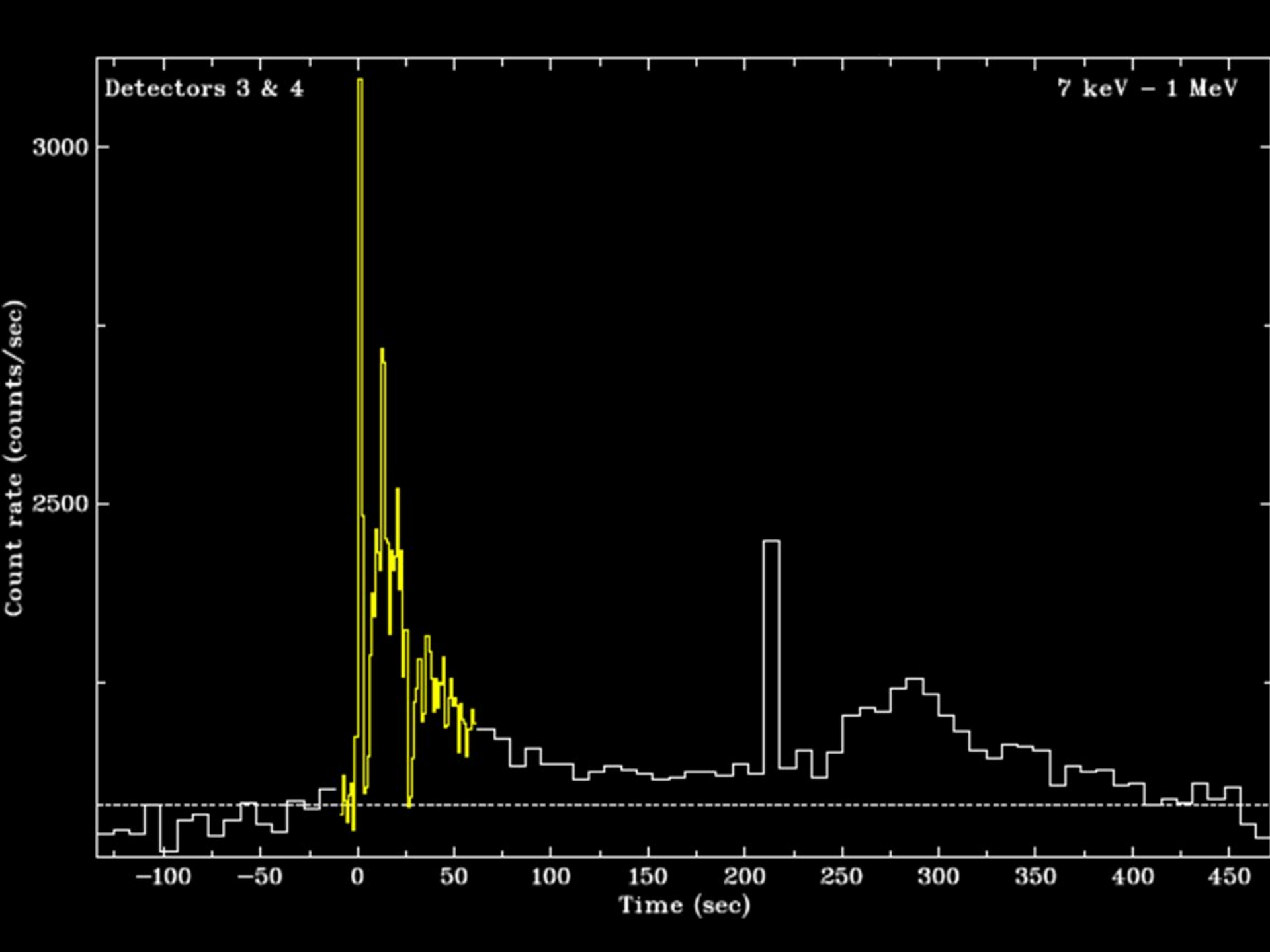
II. INSTRUMENTATION

The observations were made by detectors on the four *Vela* spacecraft, *Vela 5A, 5B, 6A,* and *6B,* which are arranged almost equally spaced in a circular orbit with a geocentric radius of $\sim 1.2 \times 10^5$ km.

On each spacecraft six 10 cm^3 CsI scintillation counters are so distributed as to achieve a nearly isotropic sensitivity. Individual detectors respond to energy depositions of 0.2–1.0 MeV for *Vela 5* spacecraft and 0.3–1.5 MeV for *Vela 6* spacecraft, with a detection efficiency ranging between 17 and 50 percent. The scintillators are shielded against direct penetration by electrons below ~0.75 MeV and protons below ~20 MeV. A high-Z shield attenuates photons with energy below that of the counting threshold. No active anticoincidence shielding is provided.

Normalized output pulses from the six detectors are summed into the counting and logics circuitry. Logical sensing of a rapid, statistically significant rise in count rate initiates the recording of discrete counts in a series of quasi-logarithmically increasing time intervals. This capability provides continuous coverage in time which, coupled with isotropic response, is unique in observatonal astronomy. A time measurement is also associated with each record.

The data accumulations include a background component due to cosmic particles and their secondary effects. The observed background rate, which is a function of the energy threshold, is ~150 counts per second for the *Vela 5* spacecraft and ~20 counts per second for the *Vela 6* spacecraft.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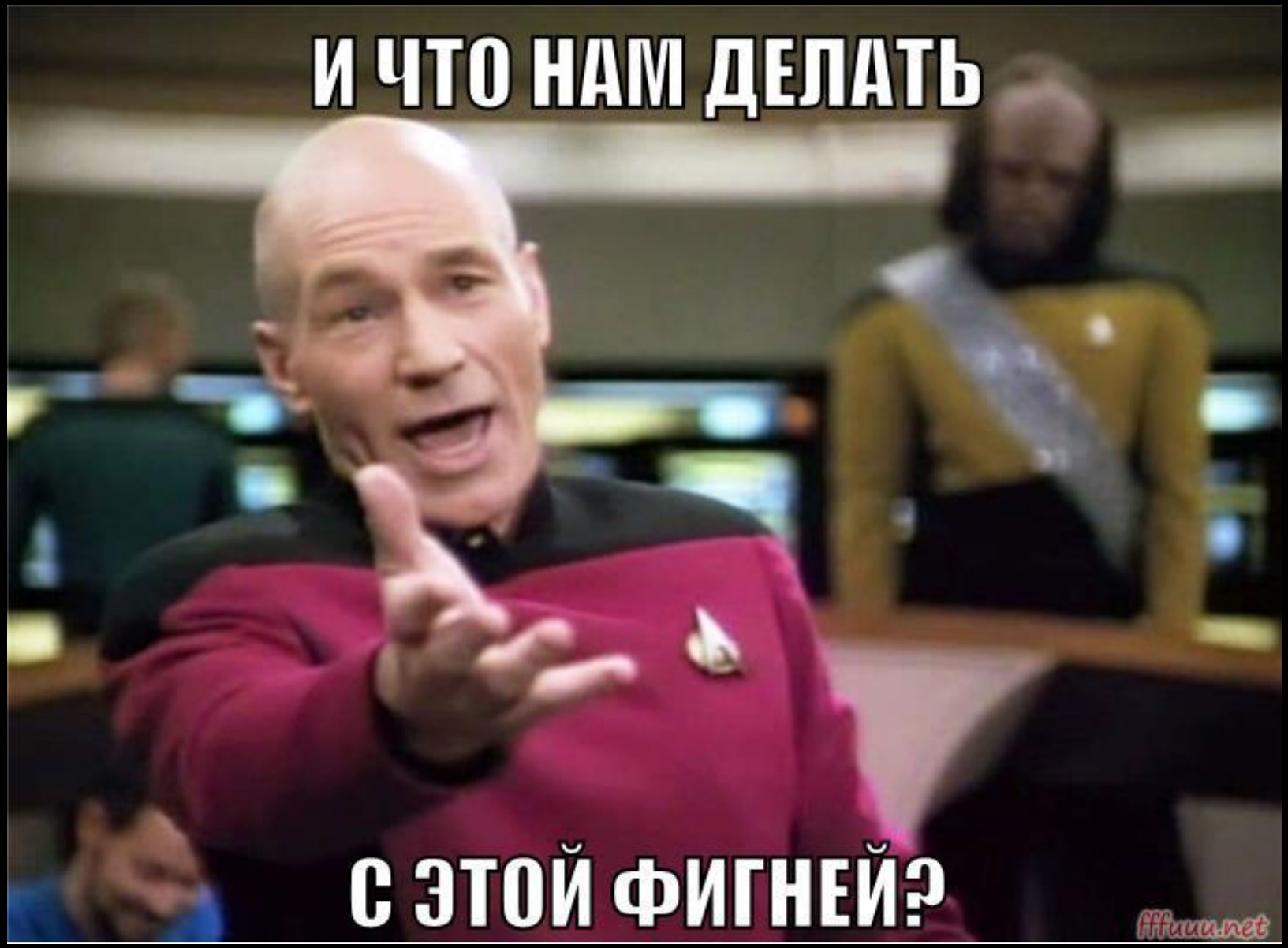
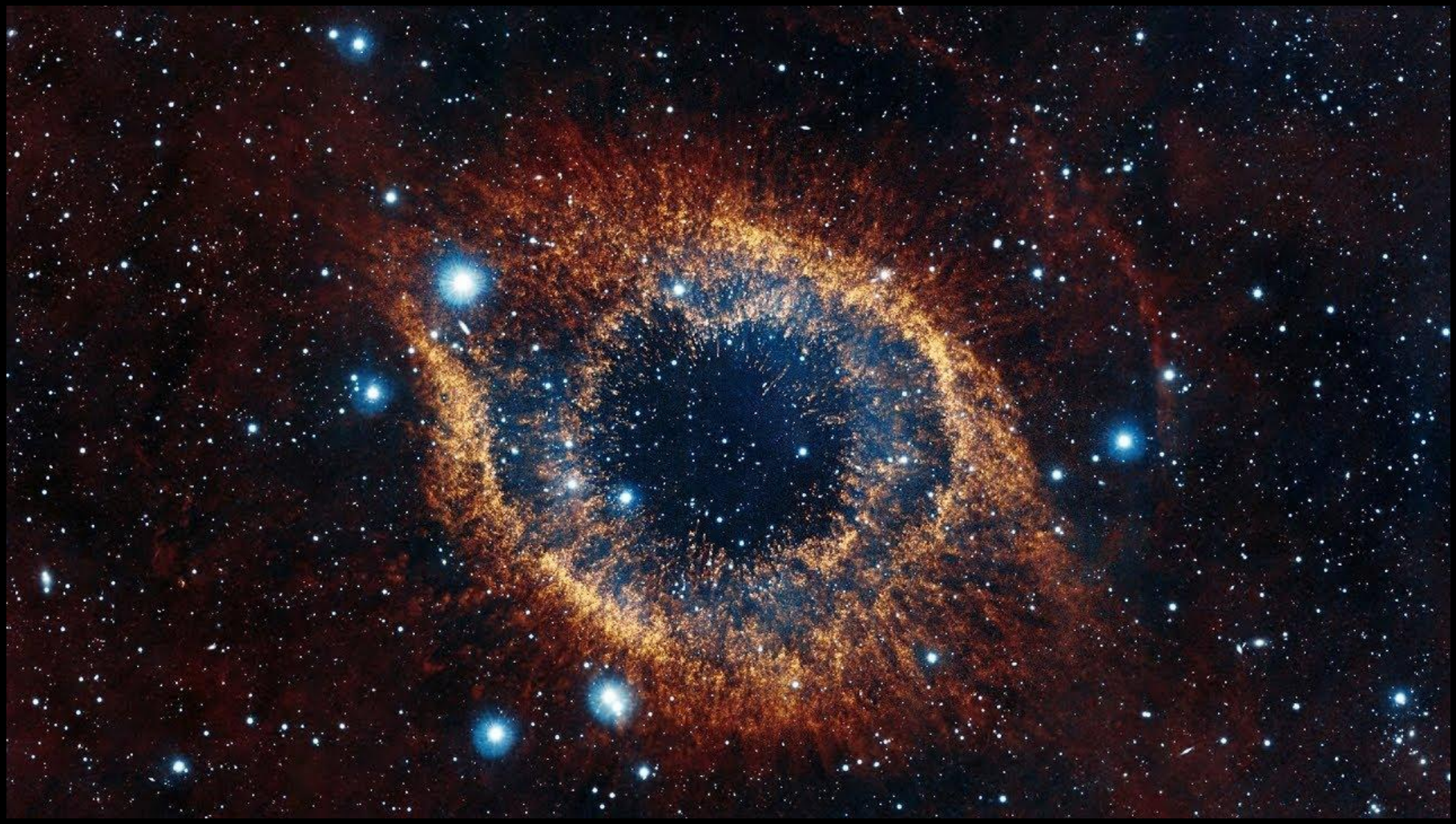
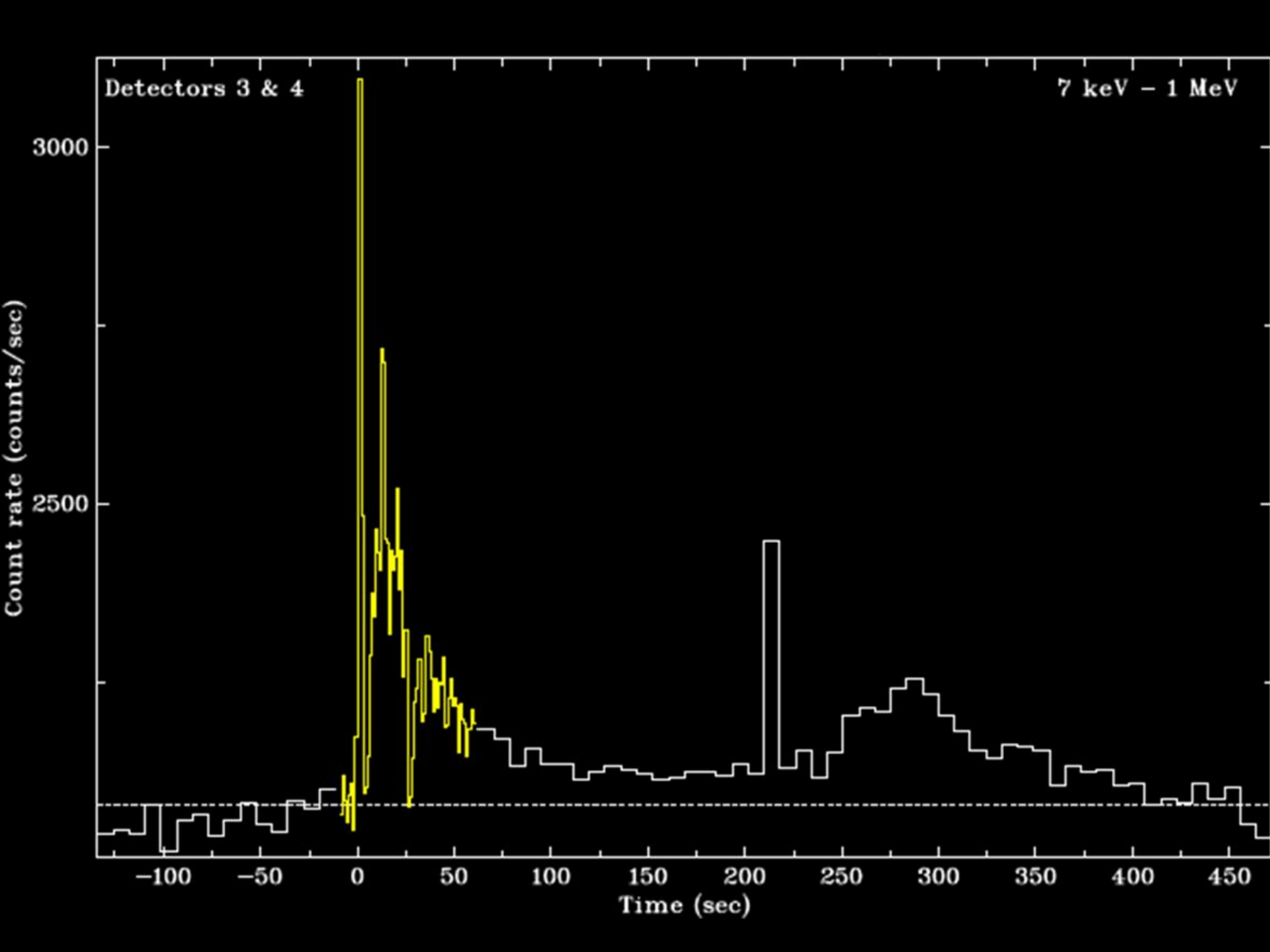
7 keV – 1 MeV
3000
2500
Count rate (counts/sec)
–100
–50
0
50
100
150
200
250
300
350
400
450
Time (sec)


И ЧТО НАМ ДЕЛАТЬ
С ЭТОЙ ФИГНЕЙ?
fffuuu.net

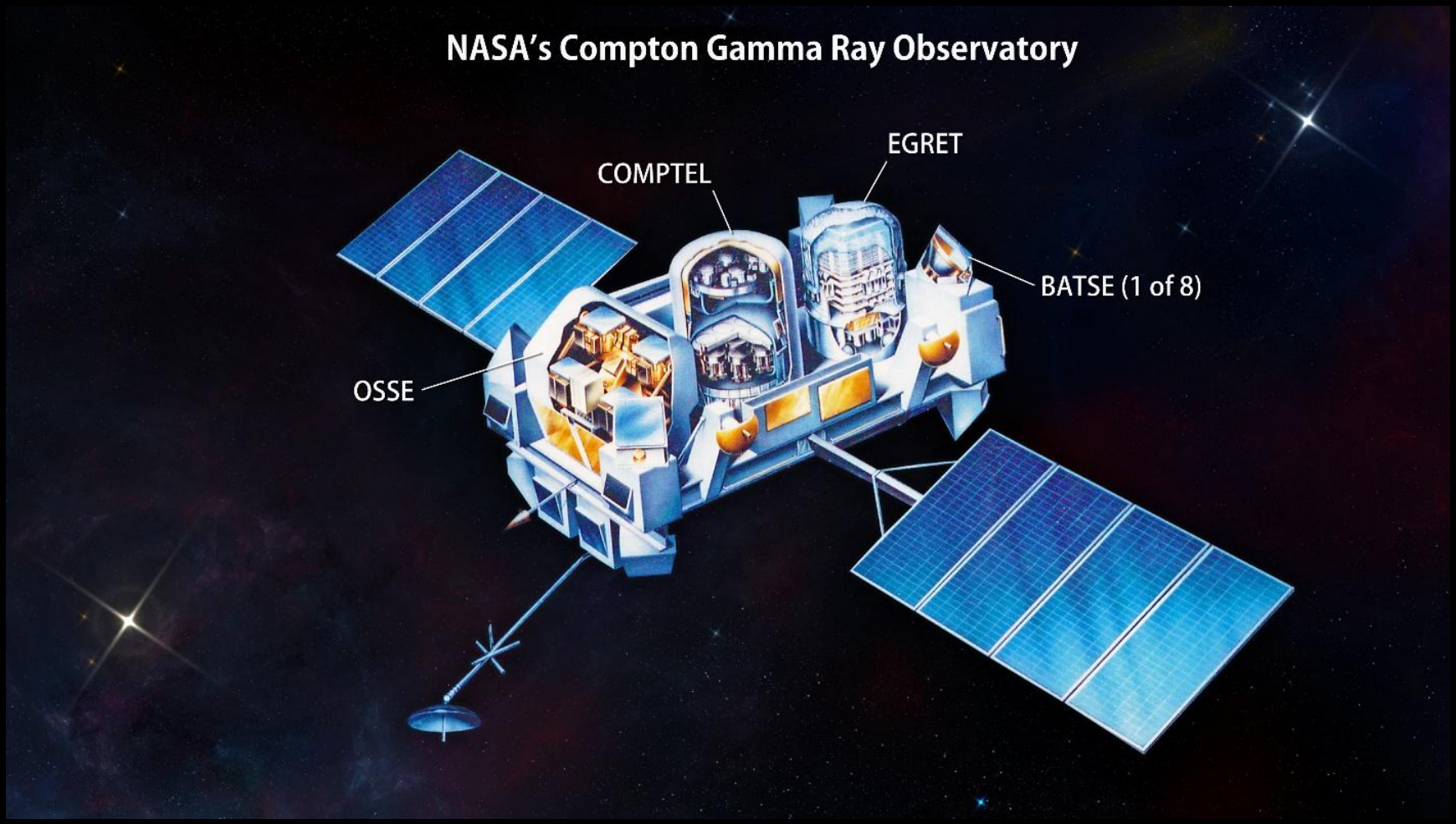
Сверхновая



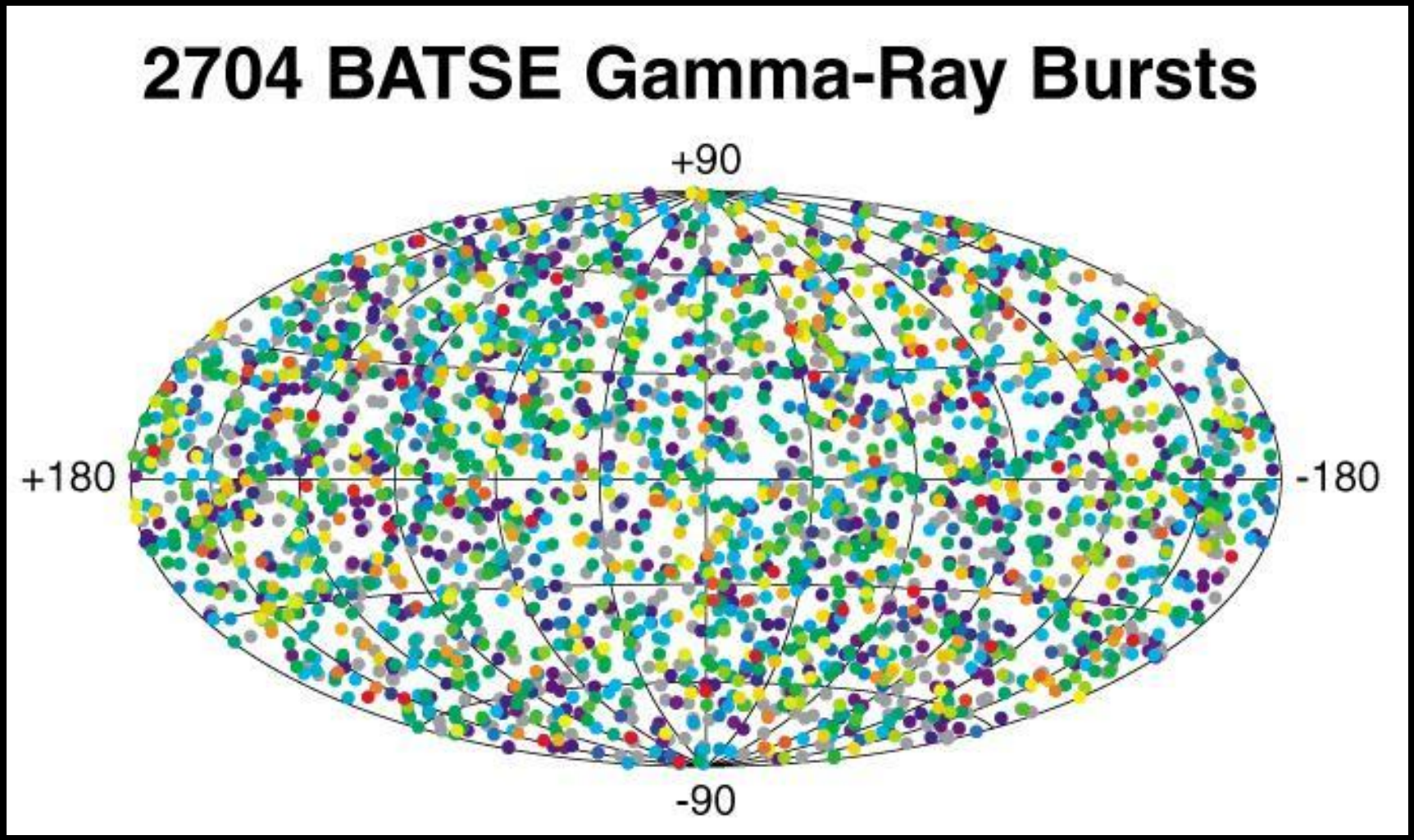
Пульсар

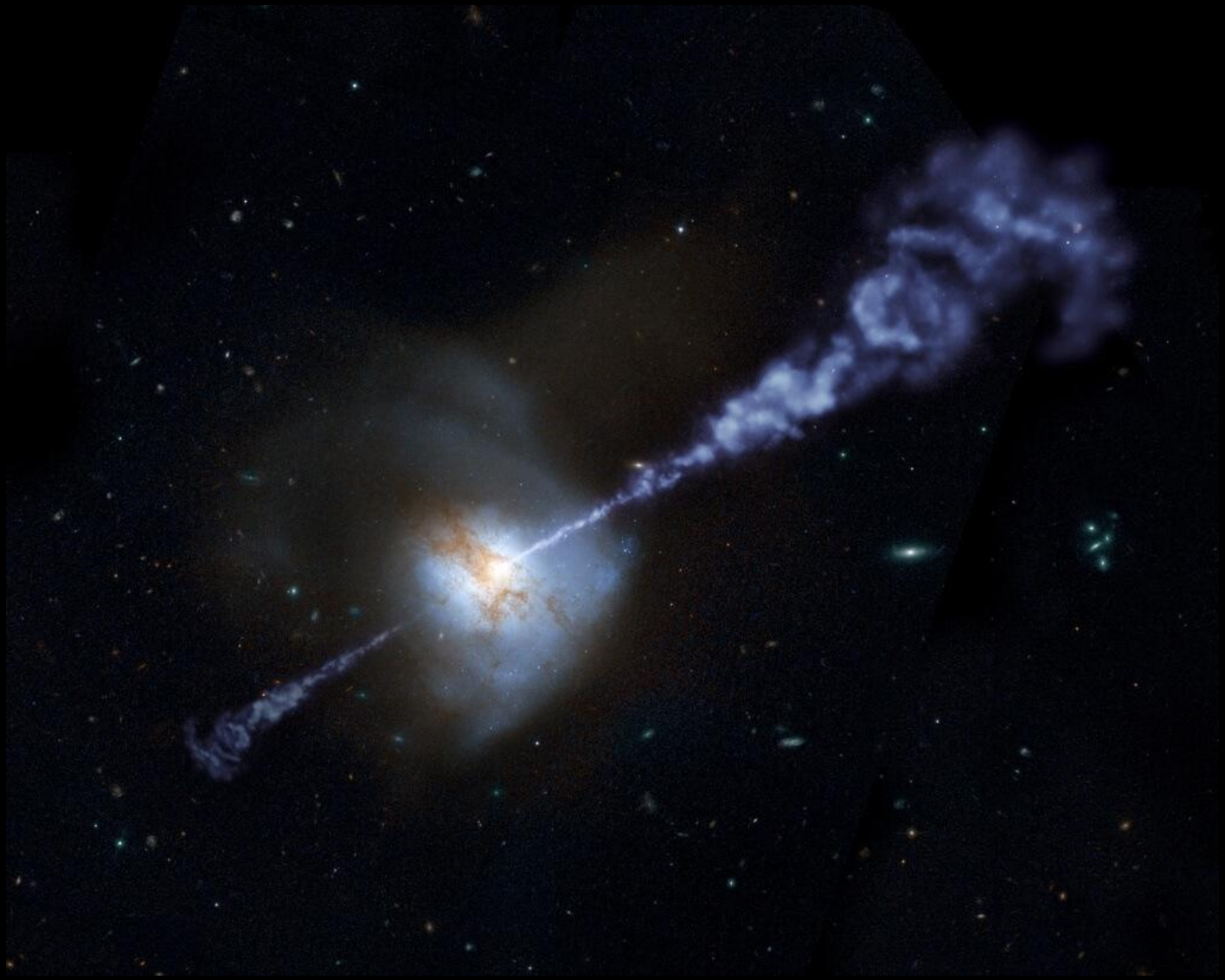

Detectors 3 & 4
7 keV – 1 MeV
3000
2500
Count rate (counts/sec)
–100
–50
0
50
100
150
200
250
300
350
400
450
Time (sec)

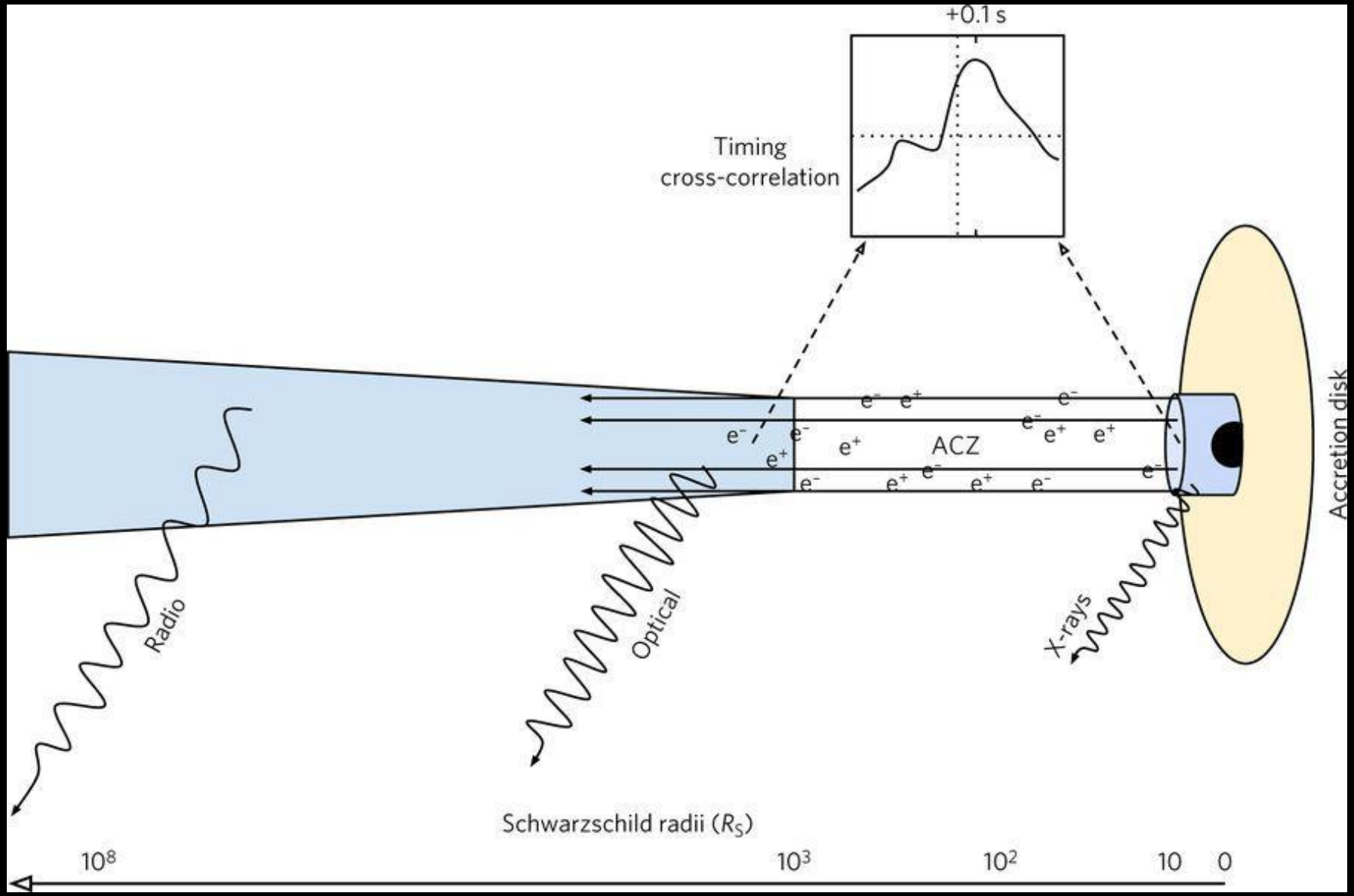
CGRO


NASA's Compton Gamma Ray Observatory
COMPTEL
EGRET
BATSE (1 of 8)
OSSE

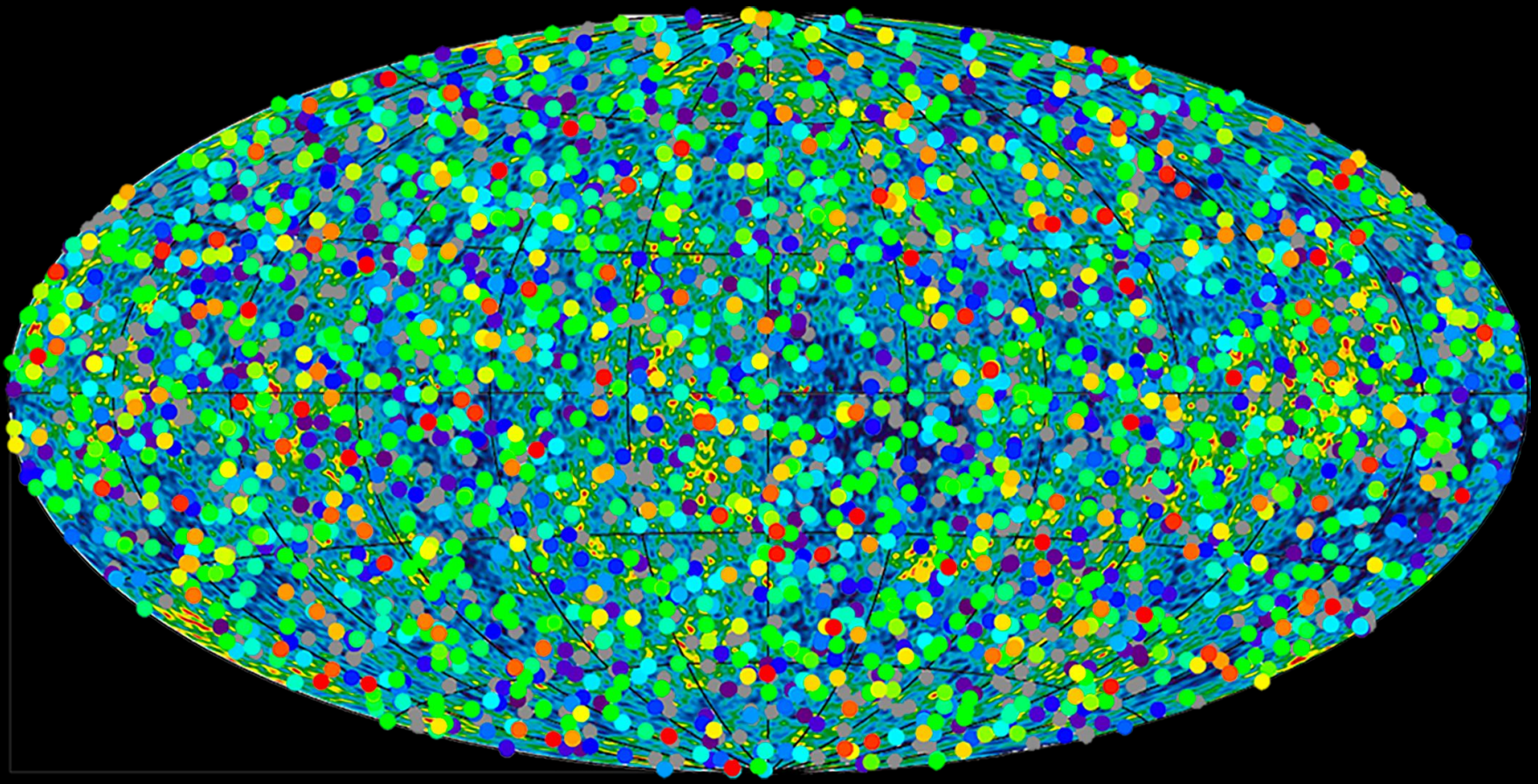
Результат работы BATSE






+0.1 s
Timing
cross-correlation
ACZ
Accretion disk
Radio
Optical
X-rays
Schwarzschild radii (R_S)
10^8
10^3
10^2
10
0

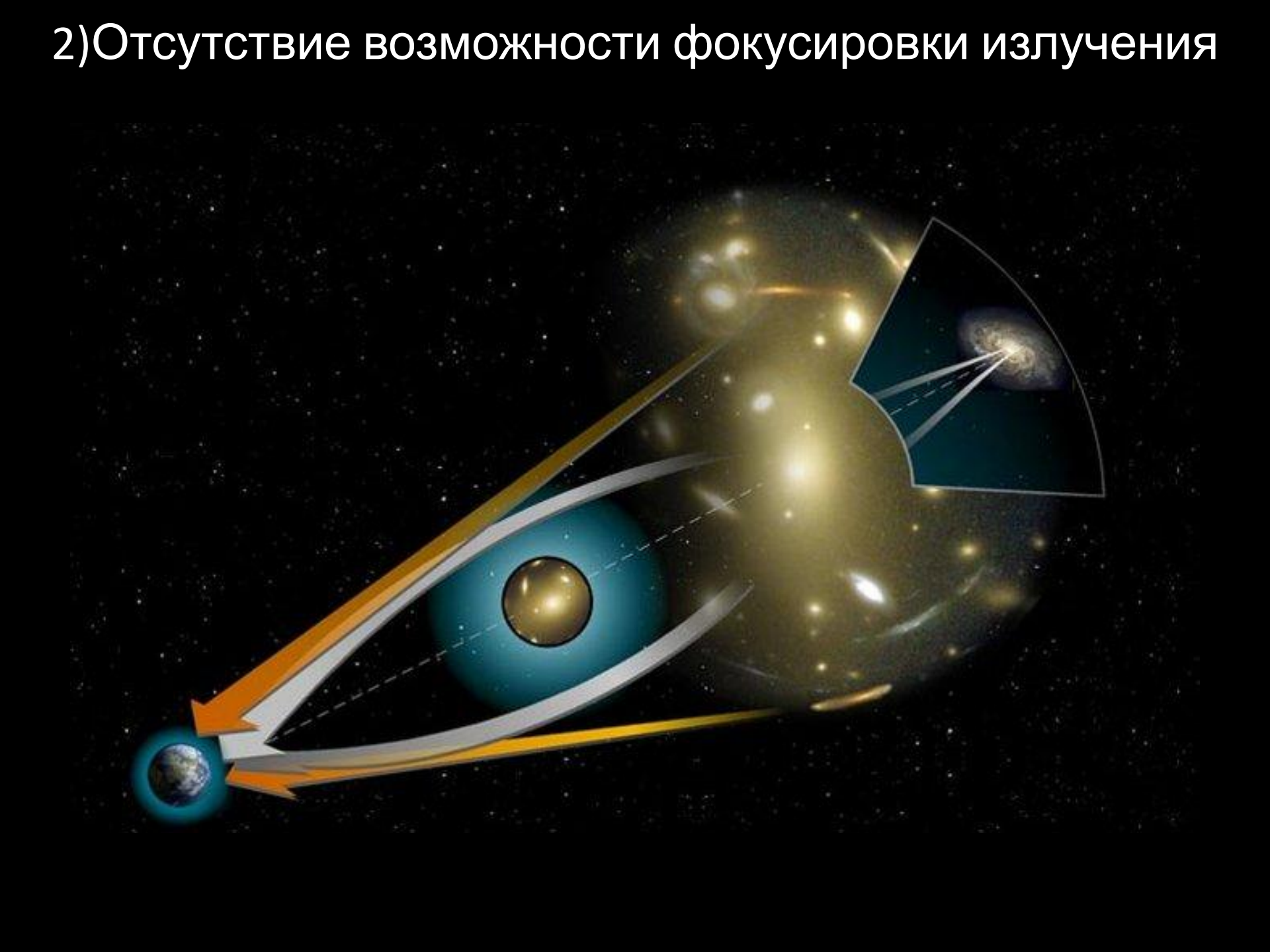
Распределение по небу



Актуальные проблемы

1) Недостаточно широкий диапазон измерений существующих обсерваторий и их неуниверсальность

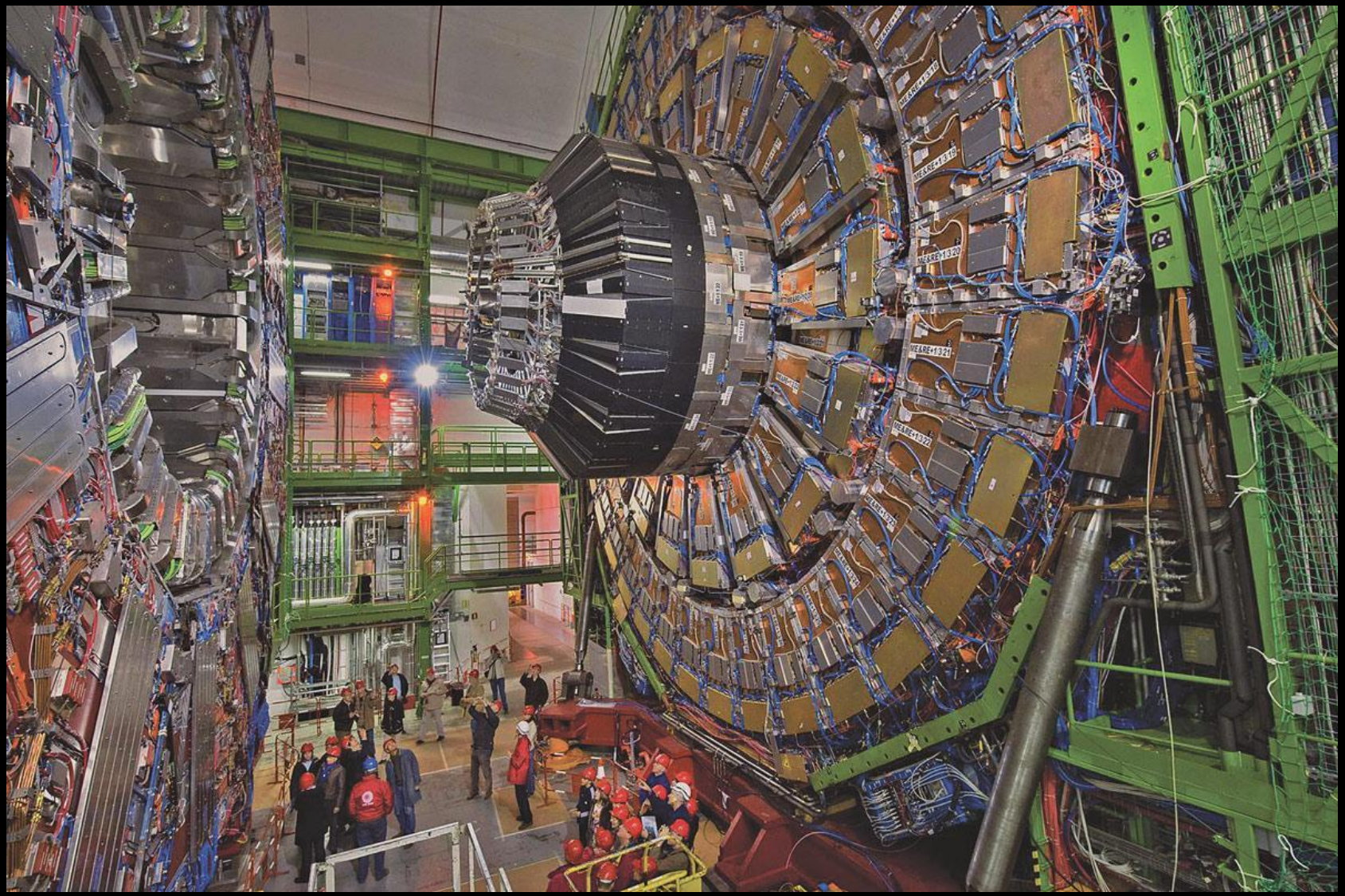
2)Отсутствие возможности фокусировки излучения



3)Плохая систематизация данных

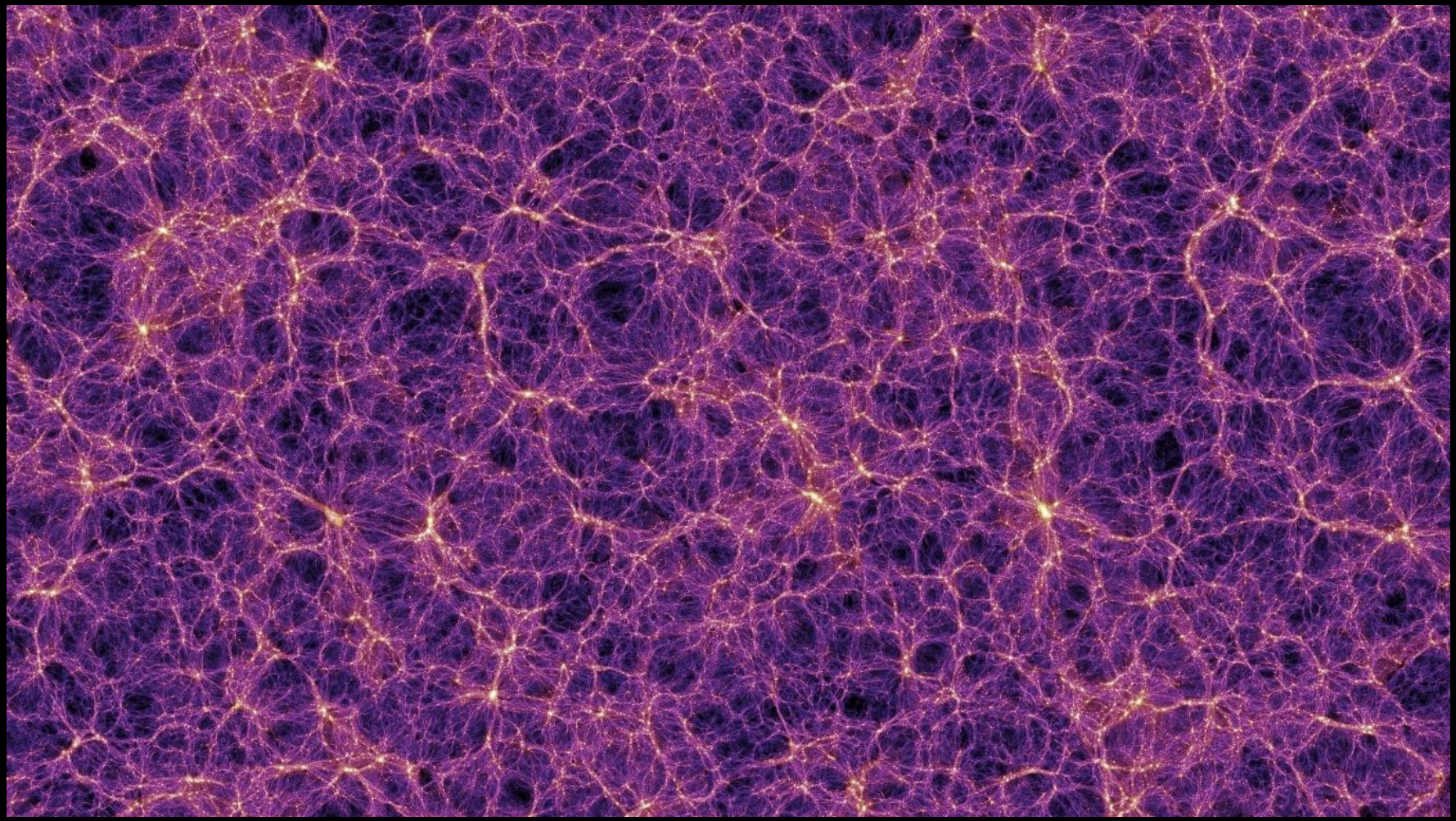
А зачем?

1)Использование принципа ускорения частиц в новых экспериментальных установках.

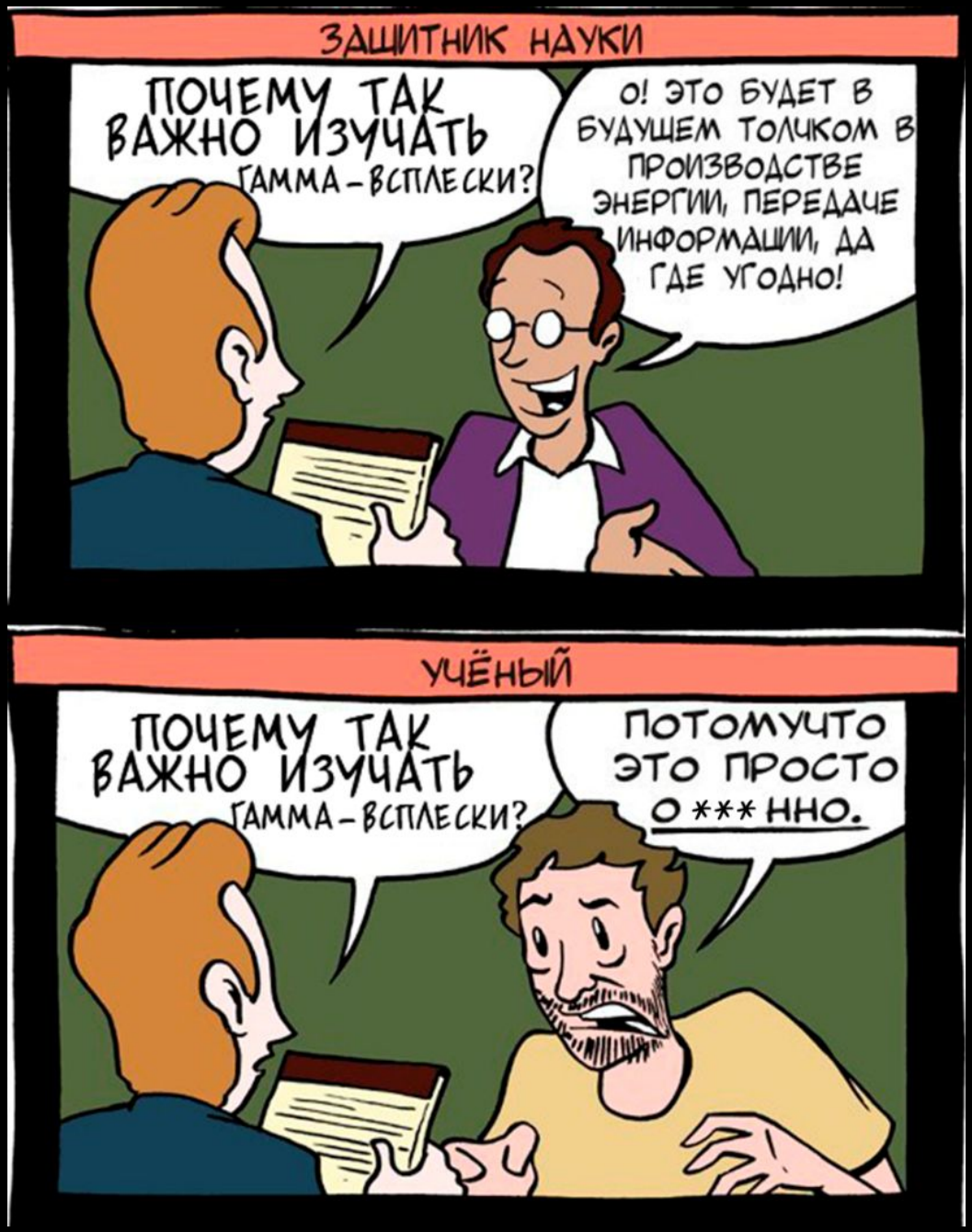


2) Знание о потенциальных источниках в пределах нашей галактики даст возможность предупредить катастрофу

3) Уточнение общей космофизической модели



4) Любопытство



Спасибо за внимание!

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