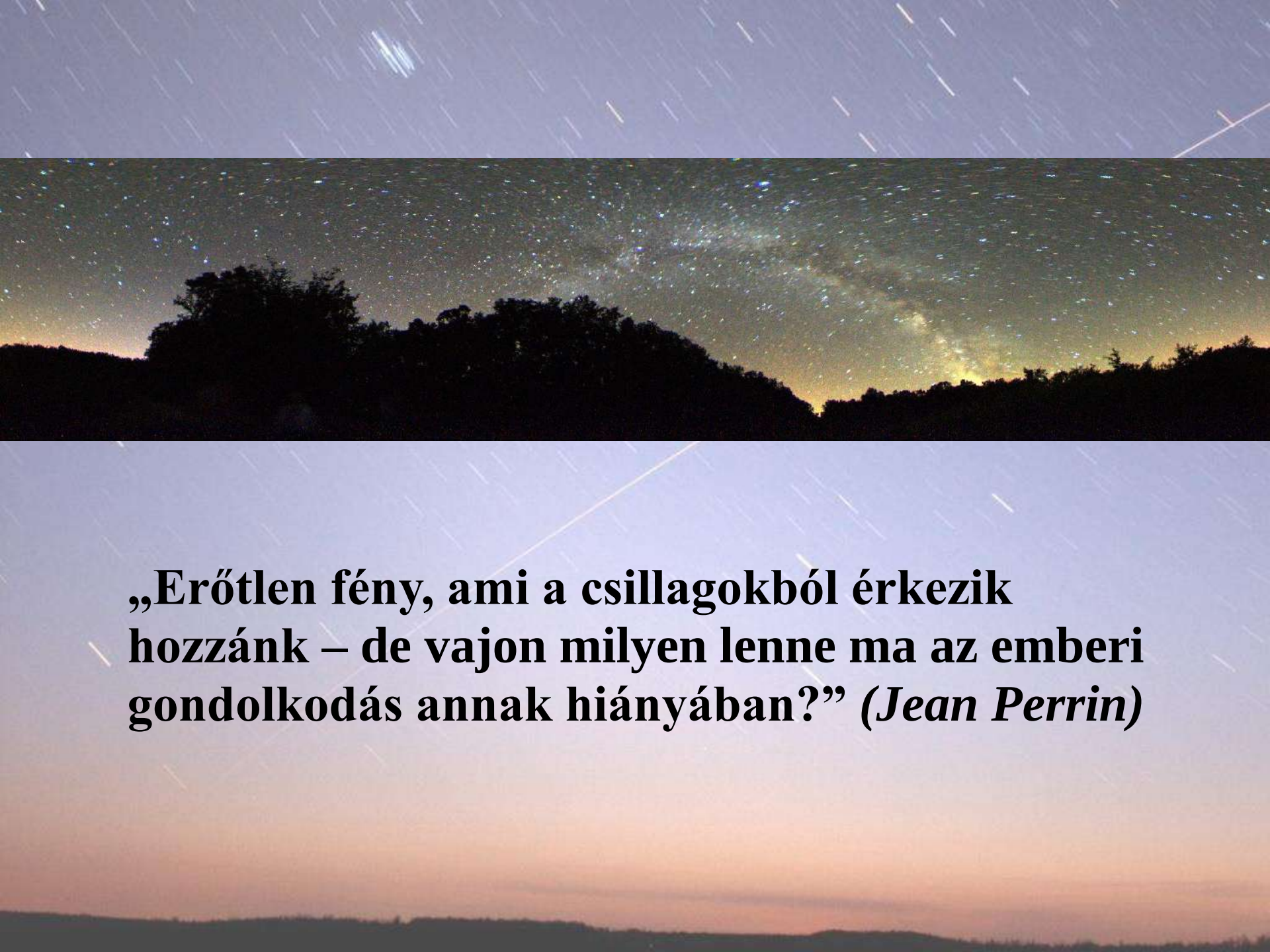
Az Univerzun hangjai

Kolláth Zoltán



„Erőtlen fény, ami a csillagokból érkezik hozzánk – de vajon milyen lenne ma az emberi gondolkodás annak hiányában?” ***(Jean Perrin)***

Történelem előtti idők

- Kőkorszak, főként neolitikum:
- Az emberi kultúra első archeológiai leletei
- Mitológia, vallás
- Csillagászat
- Zene
- …

Zene és Csillagászat

- **Ősi kultúrák: csillagászat - zene -matematika - mitológia összefüggő tudományok**
- **→ Pitagóraszi megközelítés, Szférák zenéje**
- **Kepler: A bolygómozgás zenéje**

…

- **Holst: Bolygók - Vénusz: Mars:**
- **Fiorella Terenzi: radiócsillagászat → zene**

…

Fiorella Terenzi

Collision

Heavenly Bodies

Zene és tudomány

- A DNS zenéje
  Betaglobulin


- kristályok rezgései (morfium)

- Agy hullámok

Kozmikus hangok:

Mi kell a hangokhoz:

Megfelelő közeg, amiben terjedhet
hangkeltő mechanizmus

A Földön:

Levegő
hangforrás

De mi lehet a Világegyetemben?

kvíz!

lassú pulzár – B0329
Kék bálna
Whistler
Jupiter, radió
Univerzum kezdeti fluktuáció
Denevér „radar”
Nap - rádio
Madár éneke…

Kozmikus hangok és hallás

“Egy porszem világot jelent,

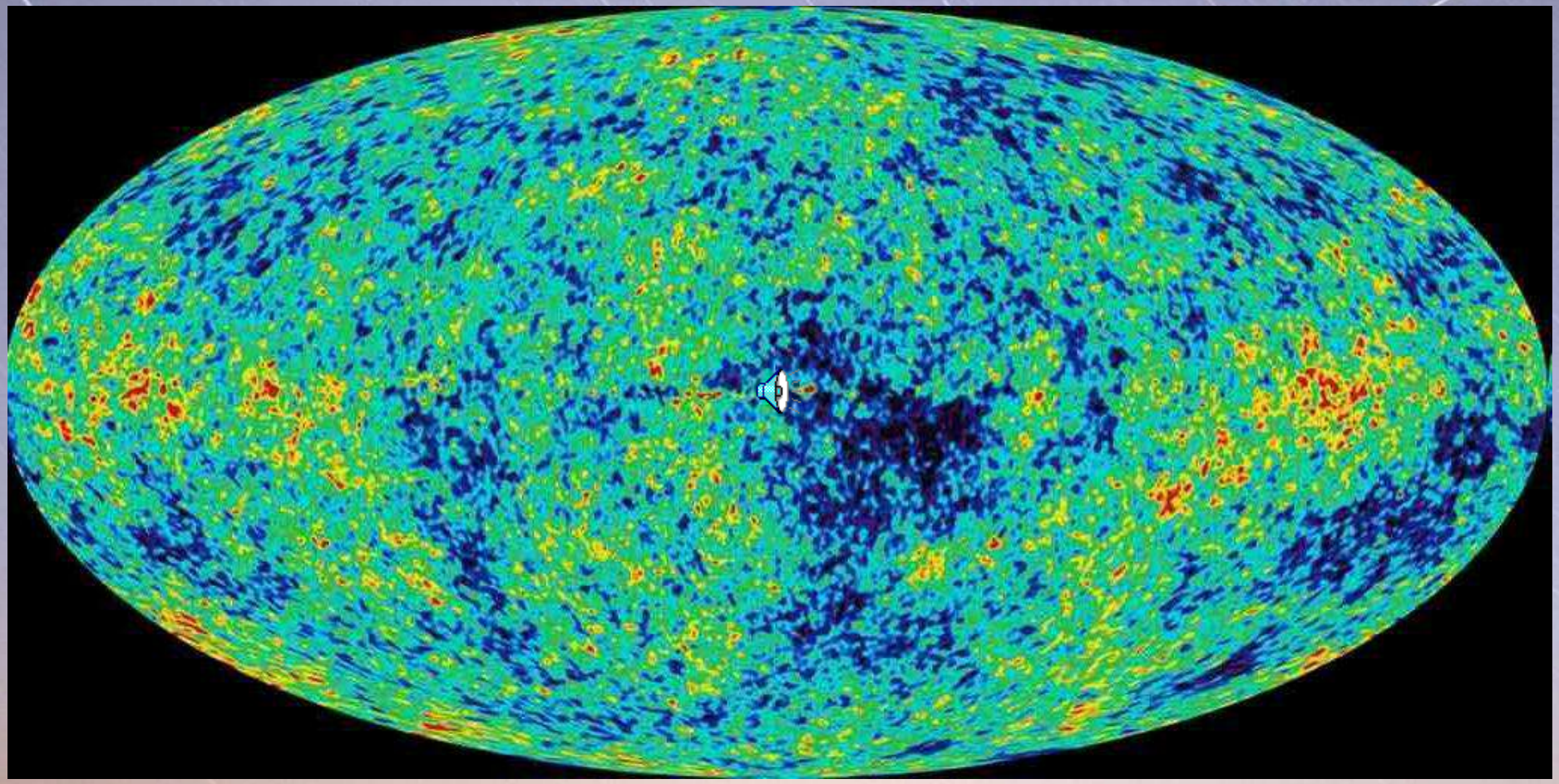
S egy szál vadvirág az eget,

Fogd föl tenyeredben a végtelent

S egy percben élj évezredet.”

(William Blake, ford: Kálnoky László)

Kozmikus háttérsugárzás



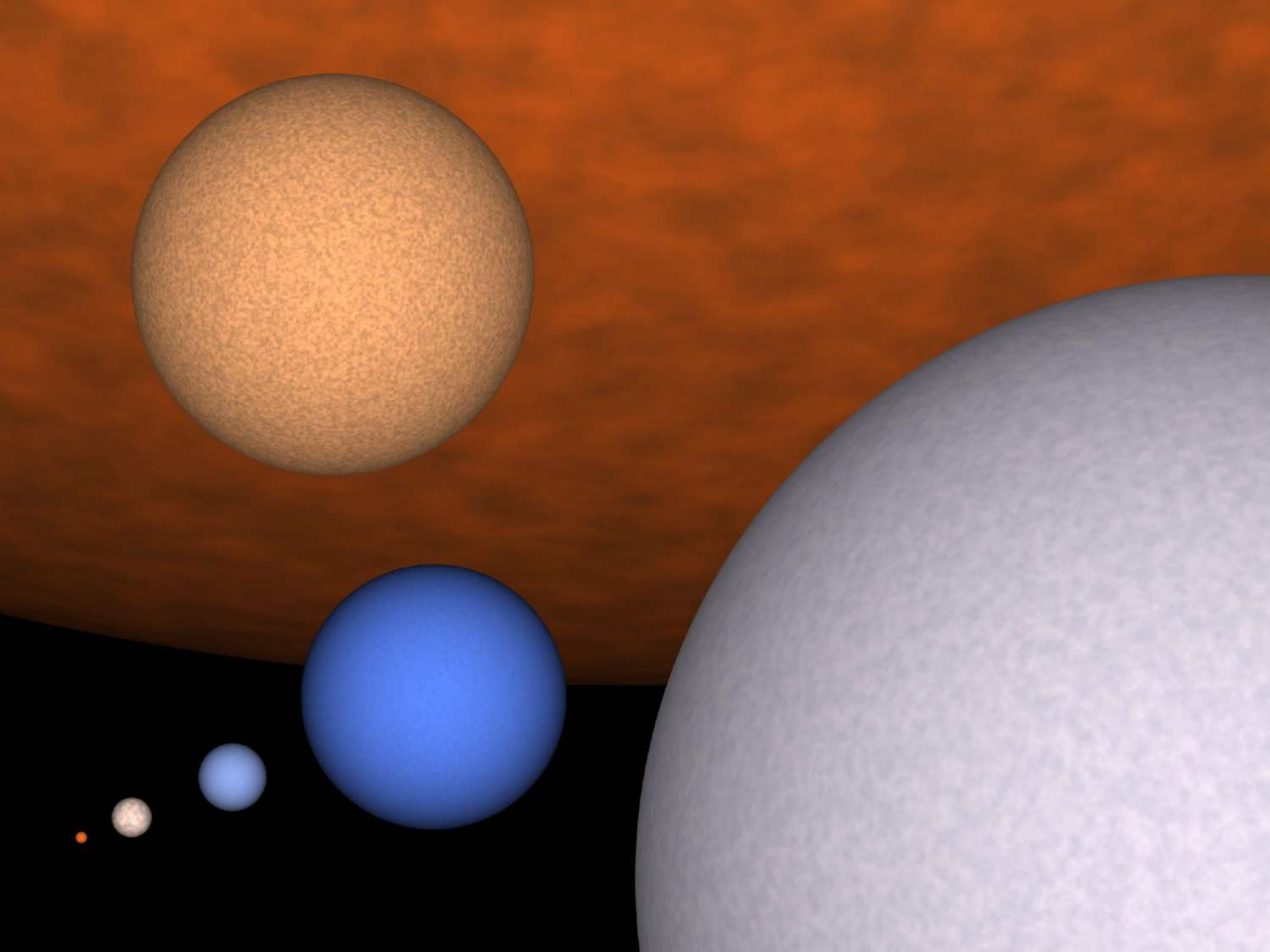
Hőmérséklet kicsiny ingadozása > nyomás változása > hangok!

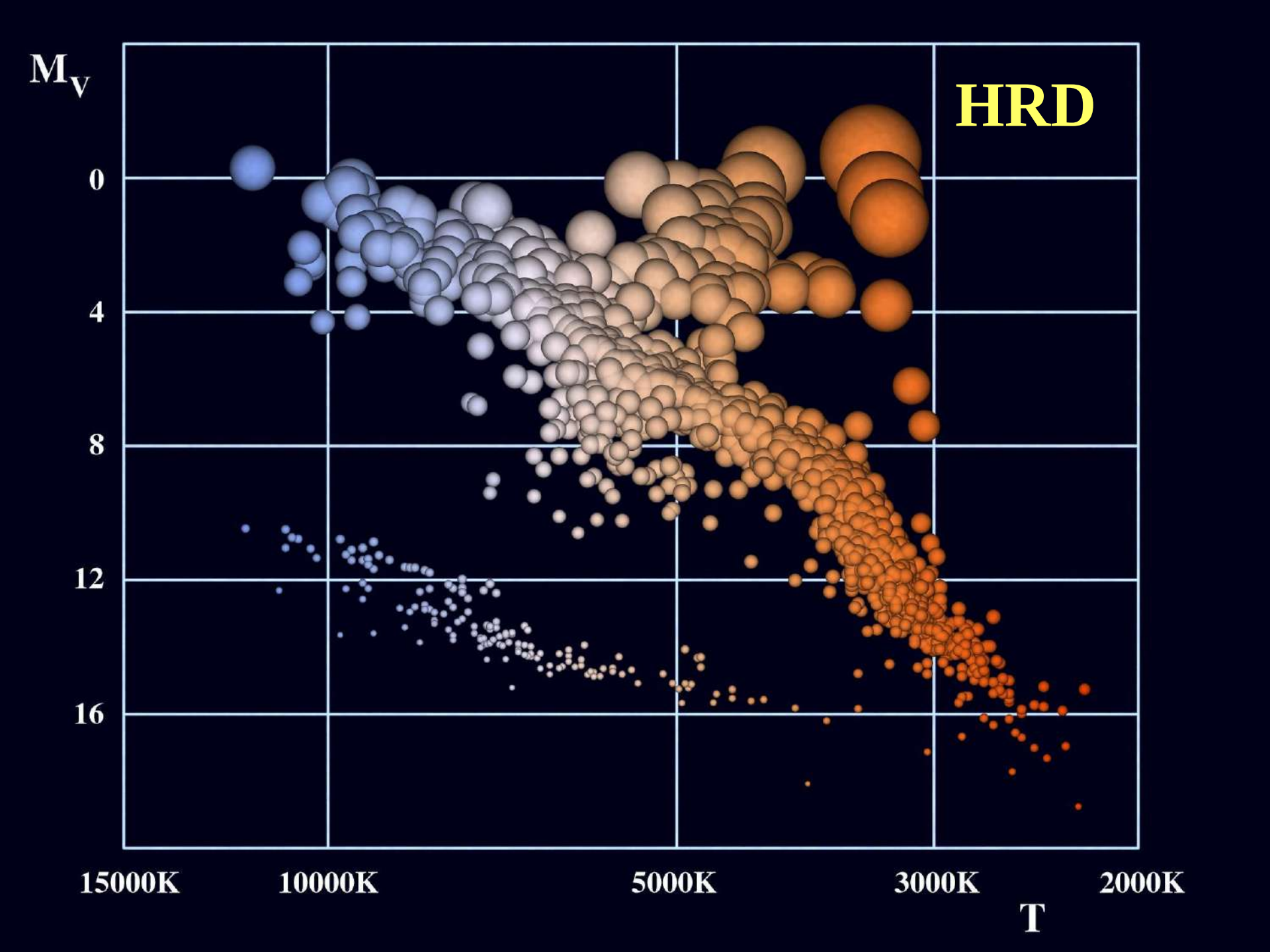
A kozmikus háttér hangja

- **Kozmikus háttér: T=2.725 ± 0.0002 K**
- **$\Delta T/T \cong 10^{-4}$ > $\Delta P/P \cong 10^{-4}$**
- **> „hangerő:” 110 dB (rock koncert)**

- **Periódus: 20000 - 200000 év**
- **48-52 oktávval a normál A alatt...**
- **Ősrobbanás…**

Credit: Mark Whittle, University of Virginia

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10000K
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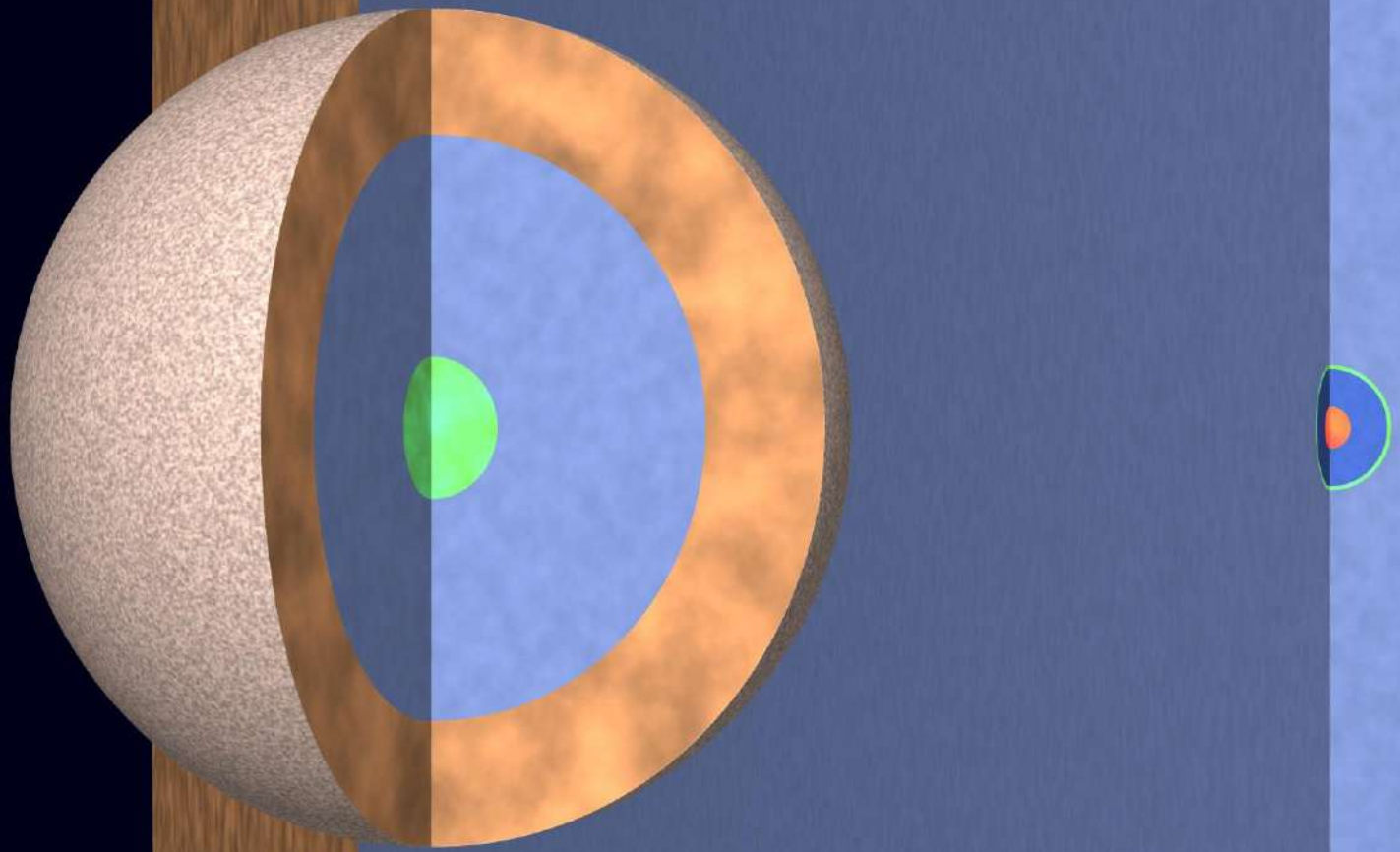
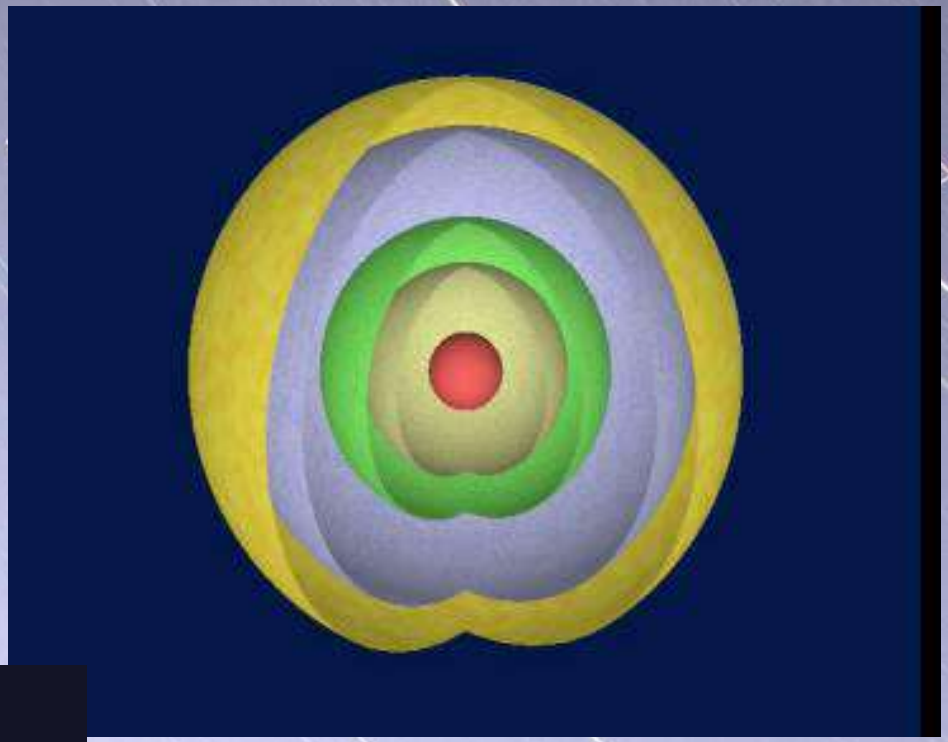
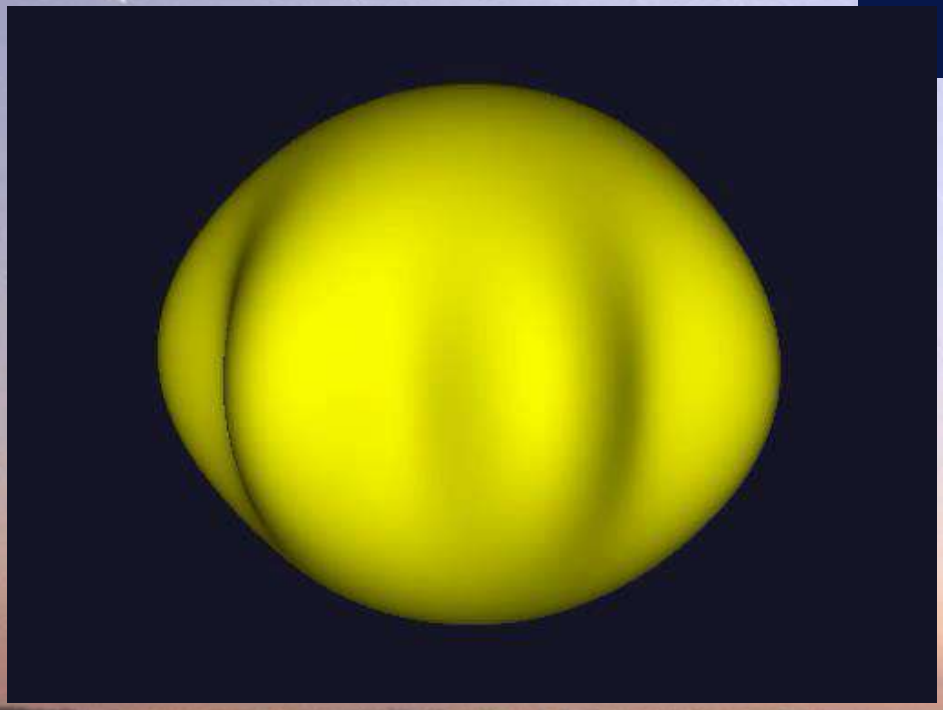
3000K
2000K
T

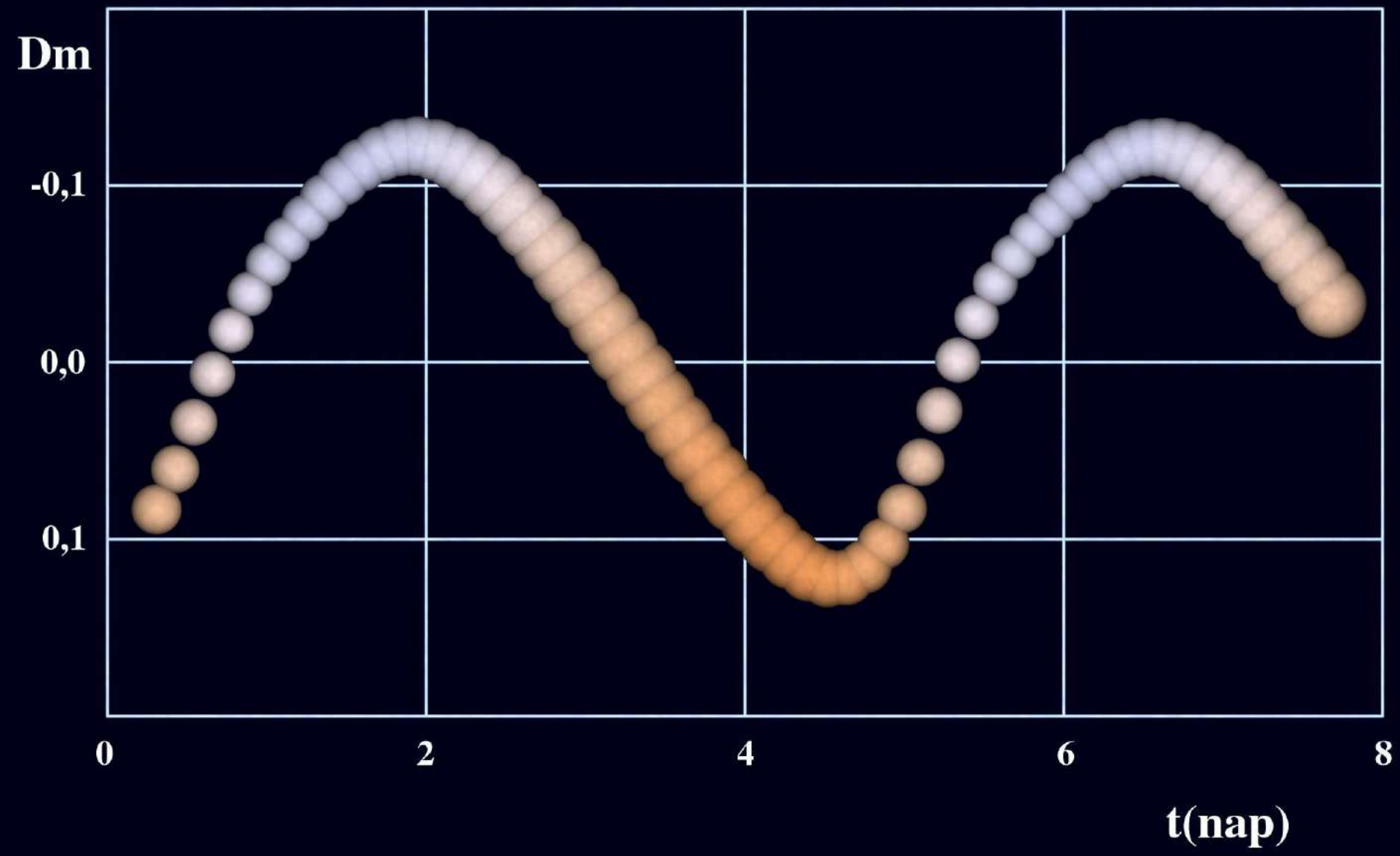
Nap és egy cefeida szerkezete



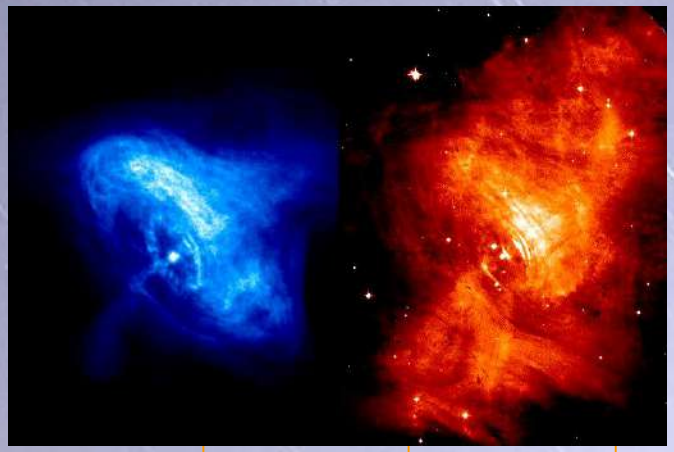


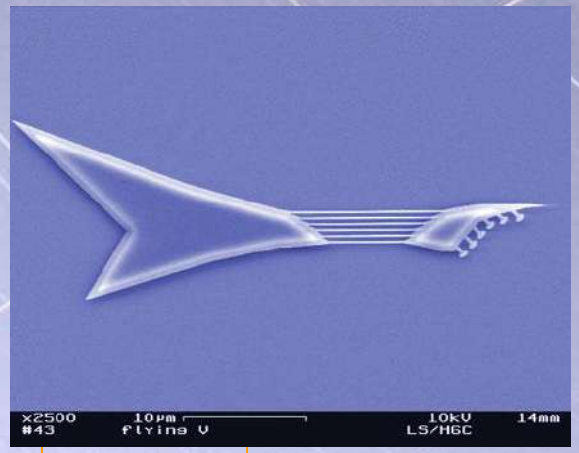


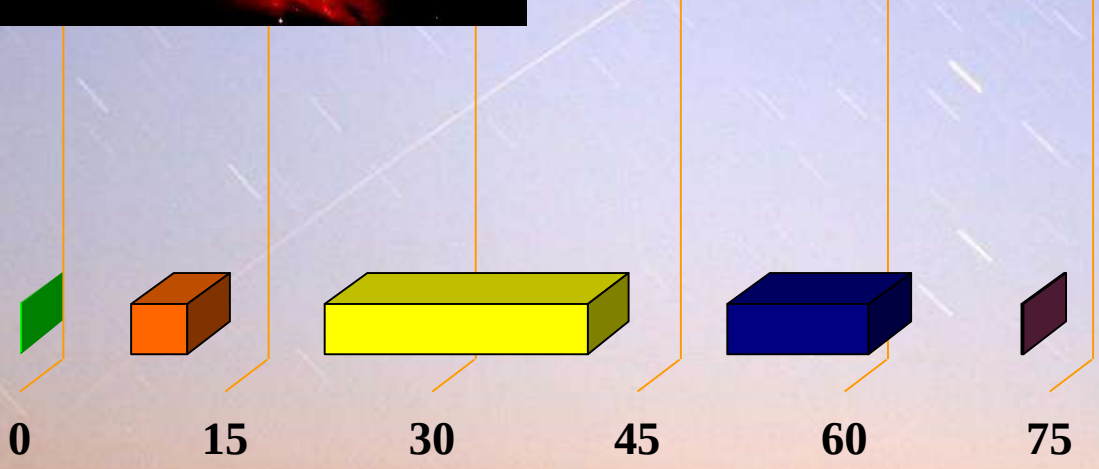
Cefeida fénygörbe



A hanghullámok világa







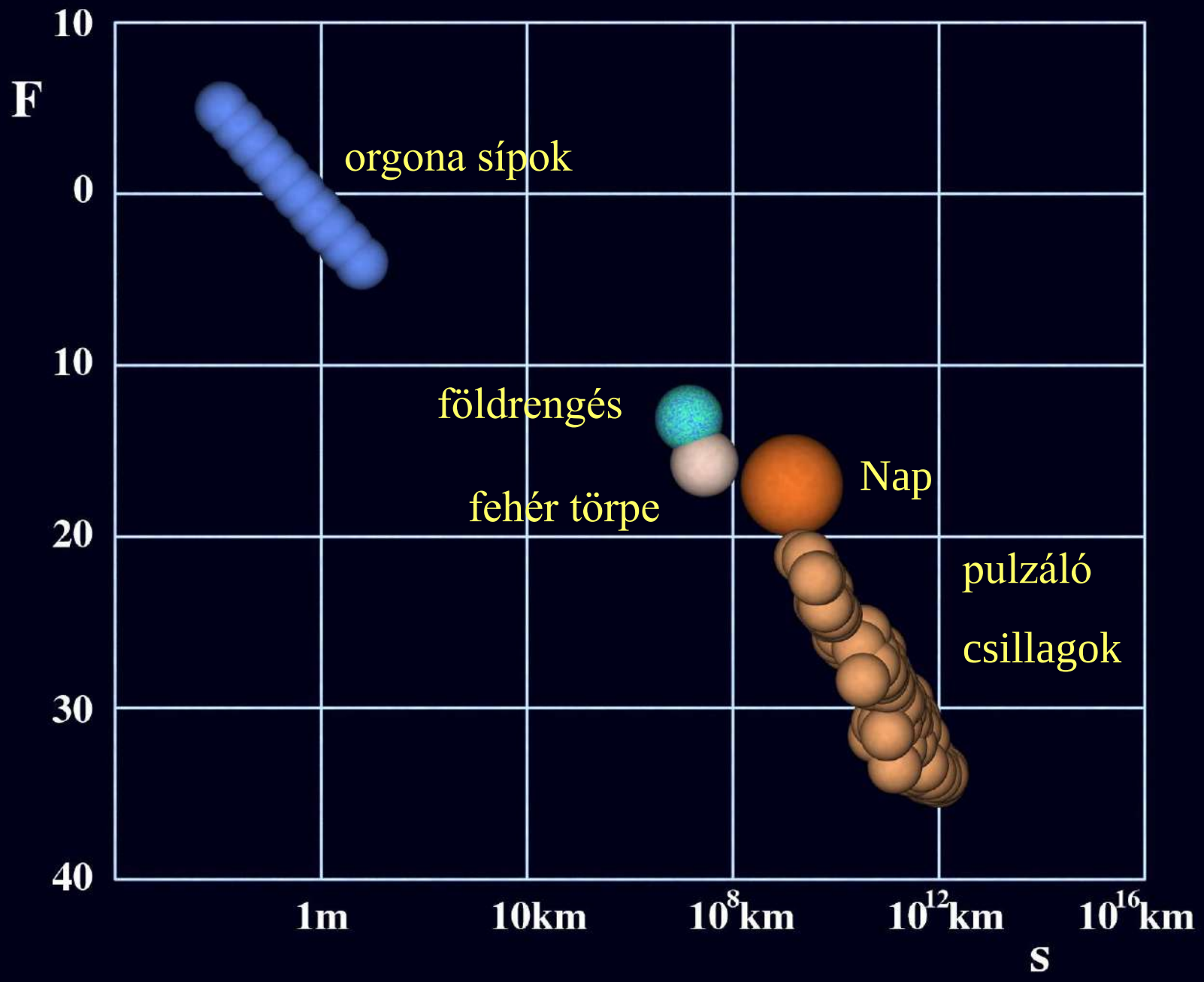
galaktikus

k. háttér

csillagok

hallható

nano-gitár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csillagok
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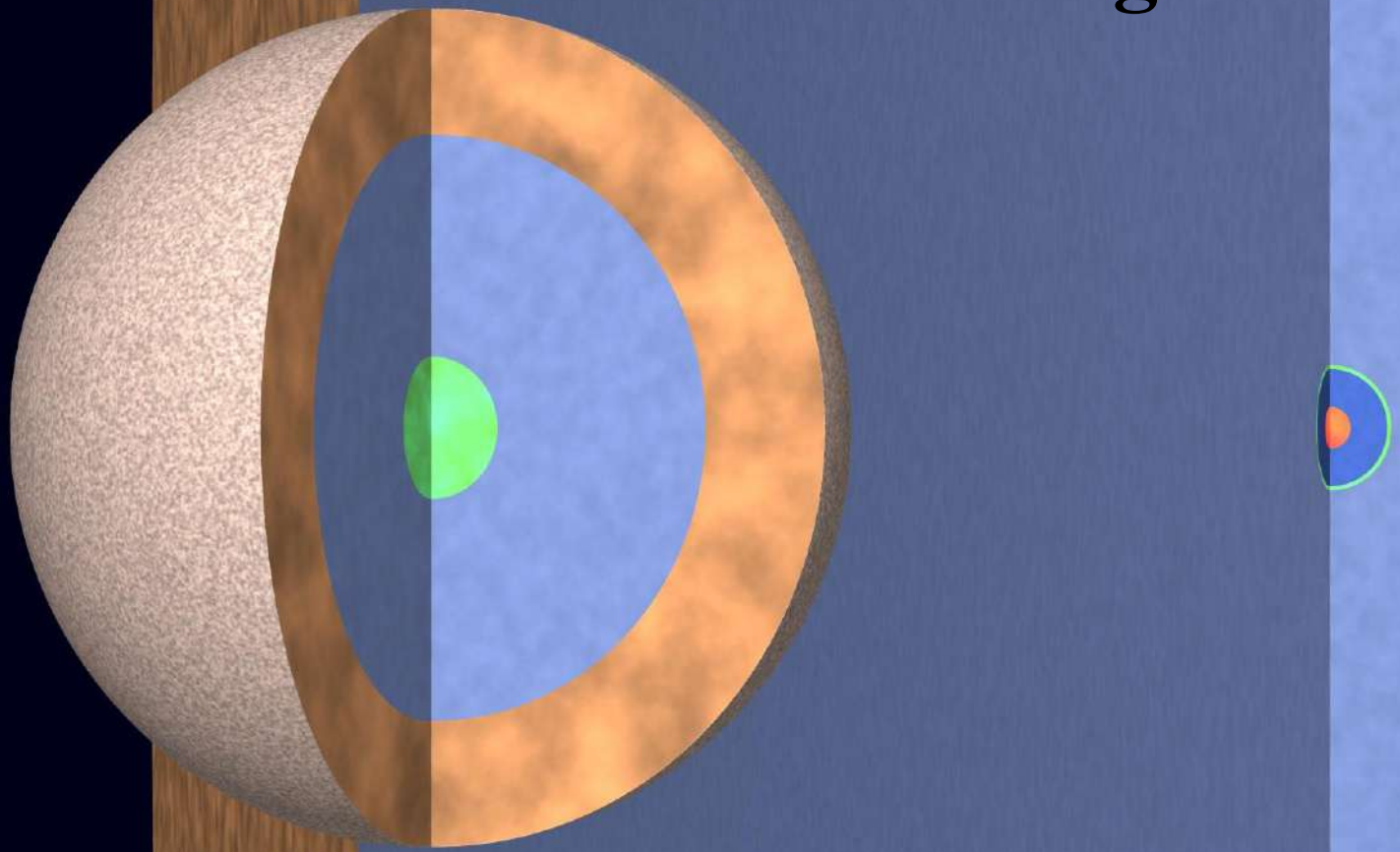
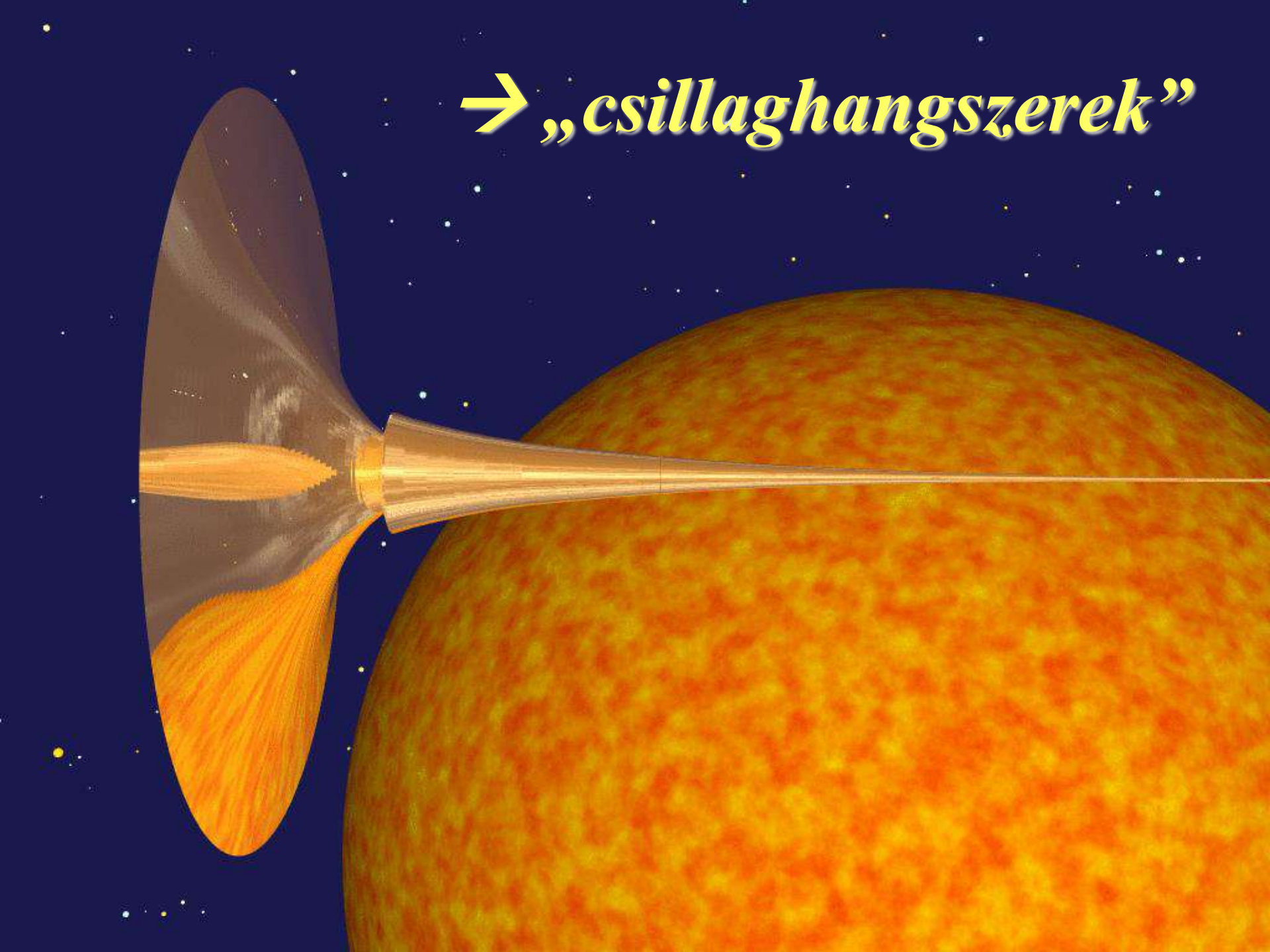
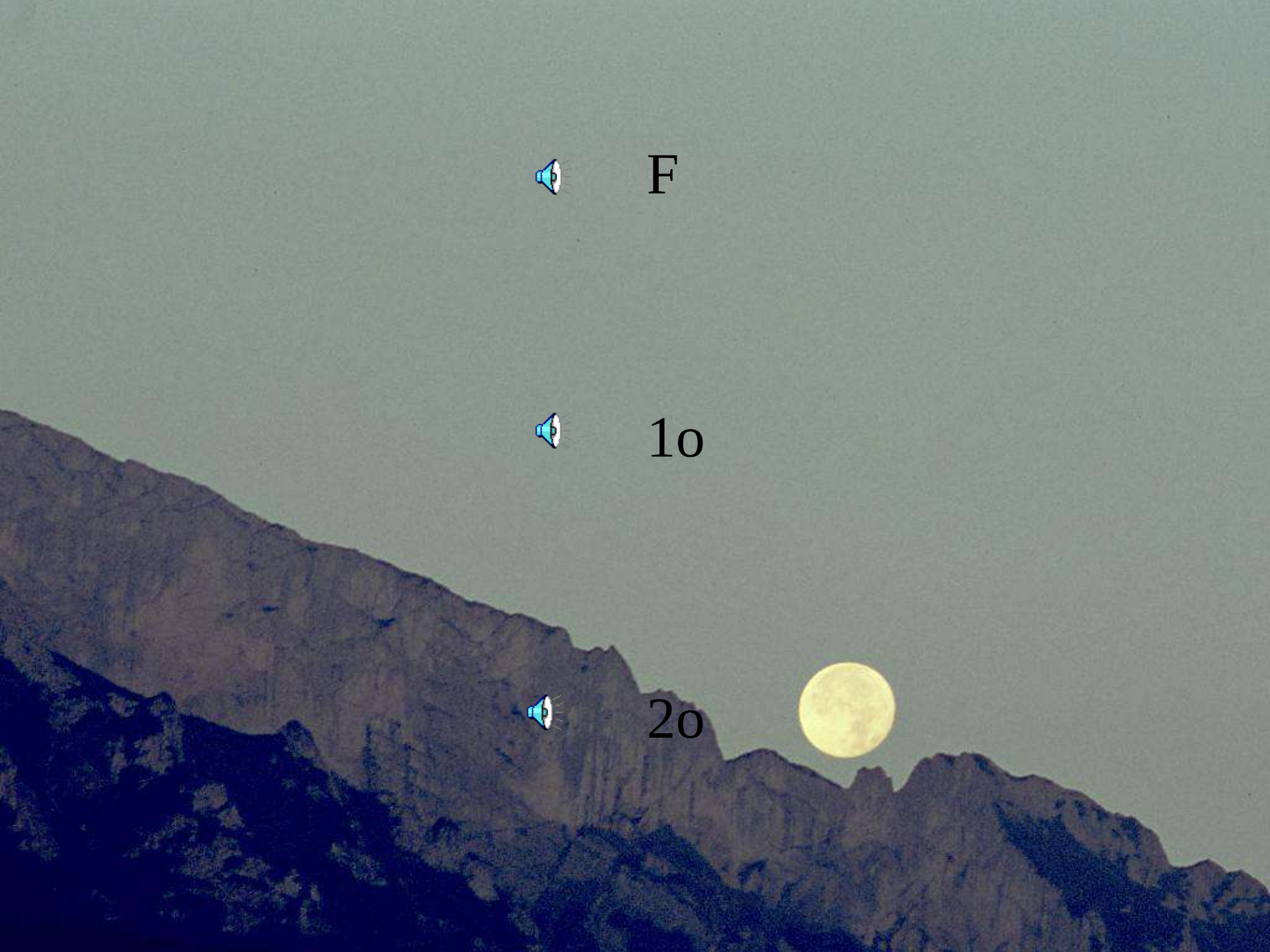
10^12km
10^16km
s

A csillag szerkezete határozza meg annak hangját



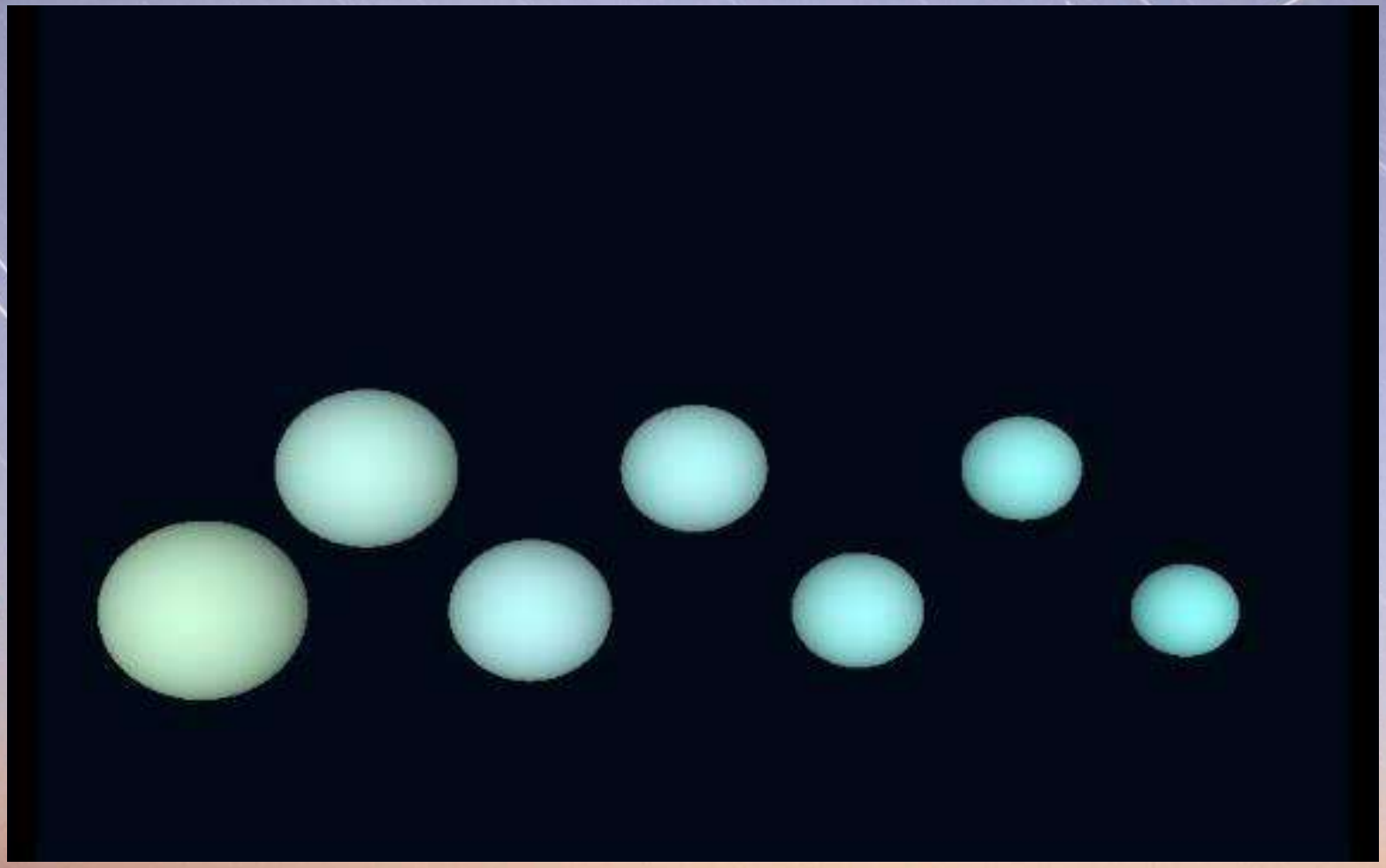

→ „csillaghangszerek”


F
1o
2o

- **Trombita-szerű hang**
- **Csillag felhangjai**
- **Összetett csillaghang**

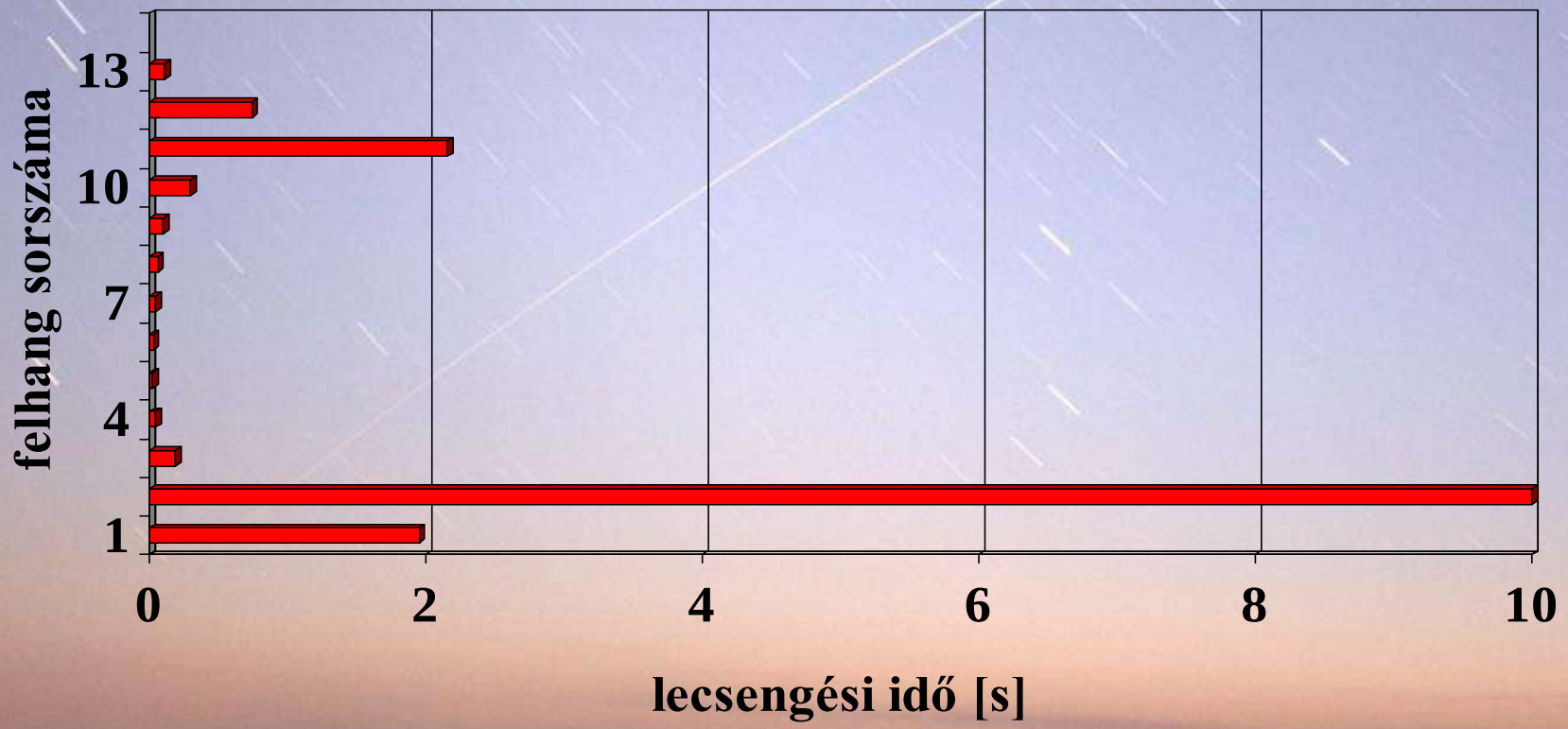
RR lyrae csillagok az M3 gömbhalmazban

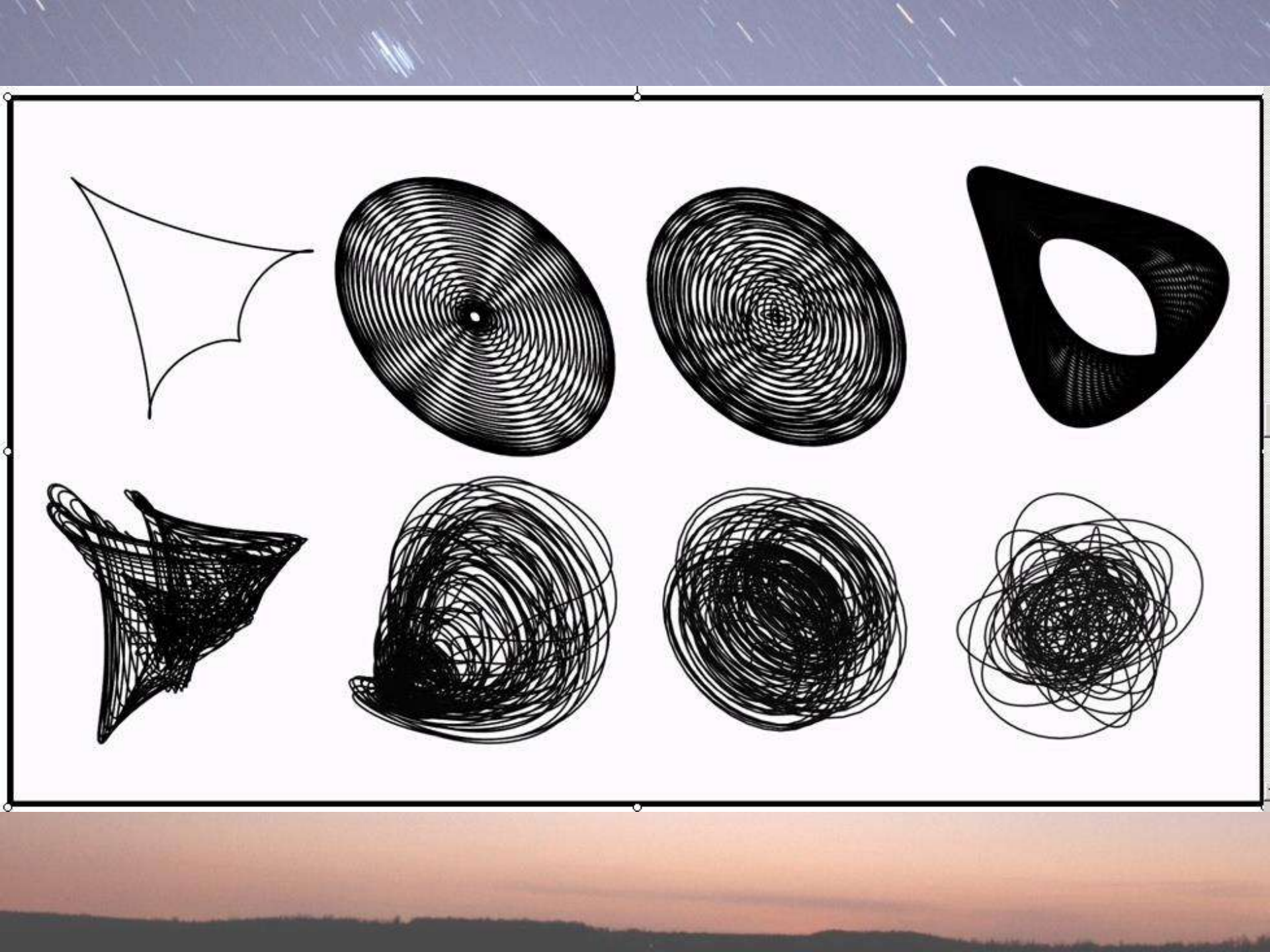
A csillaghangok lecsengése….



“Csillagharangok”

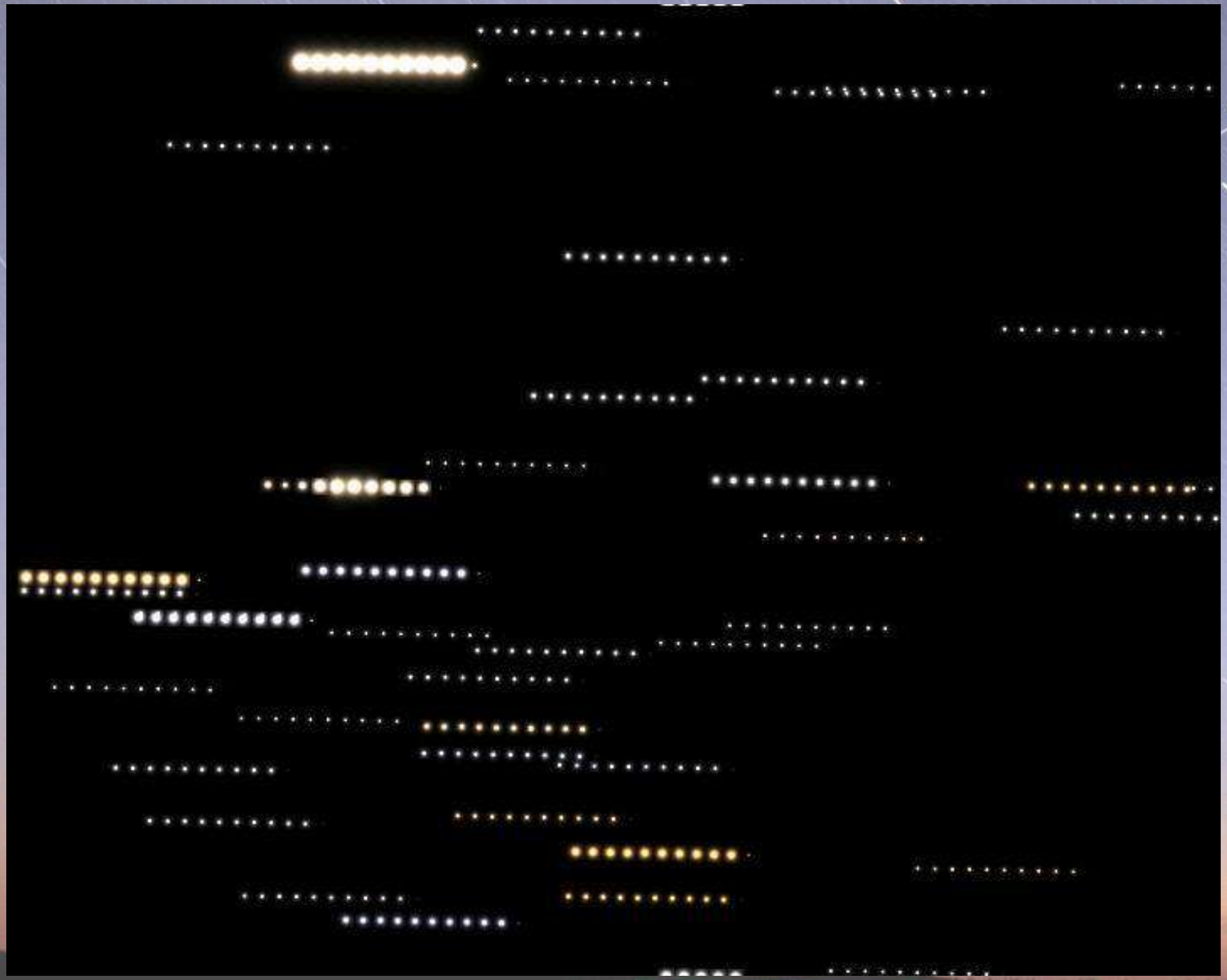
- A csillaghangok természetes lecsengése

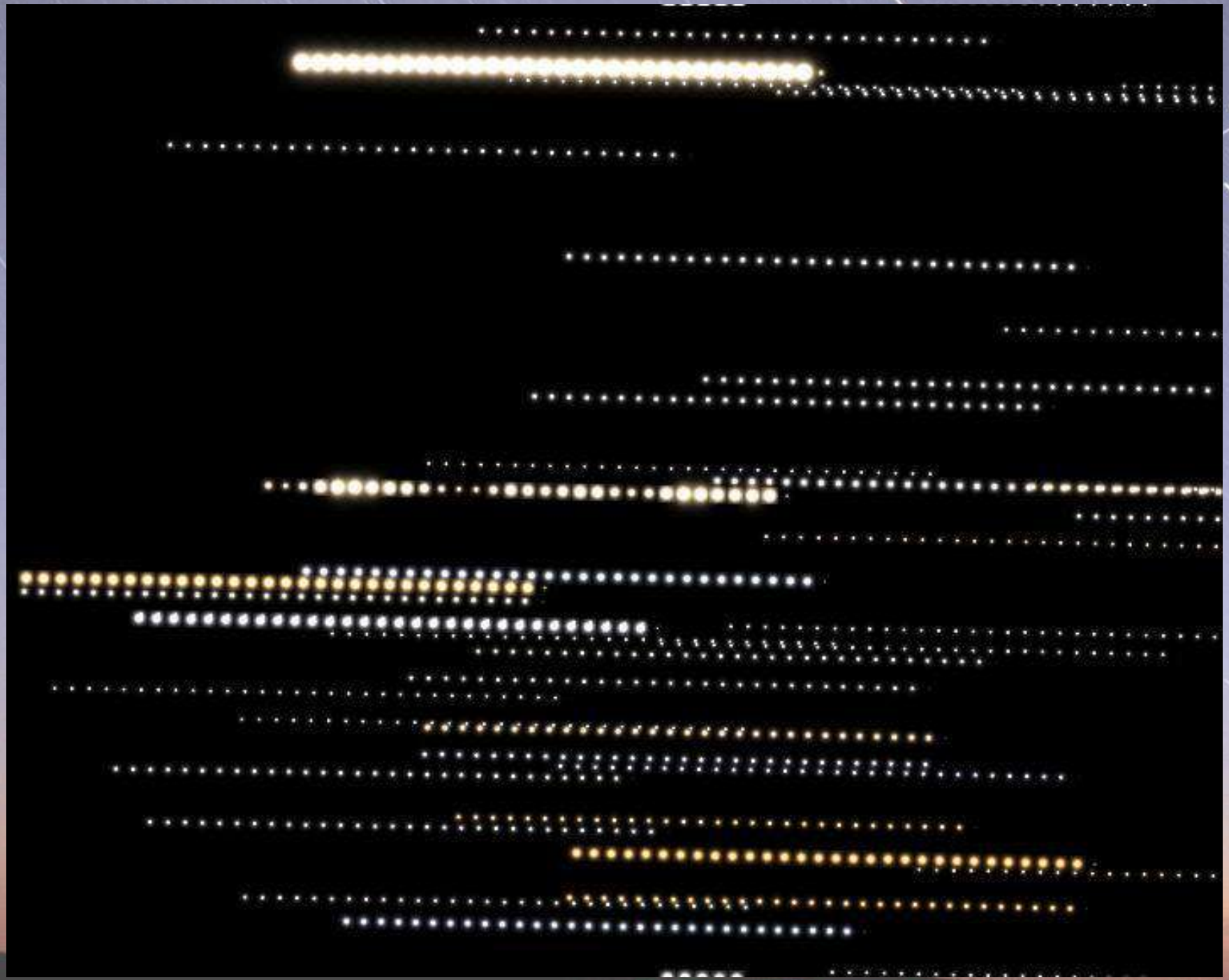




R Scuti

- “Kereső térkép”
- 14 daponta egy “kép”
- A csillag fénygörbéje



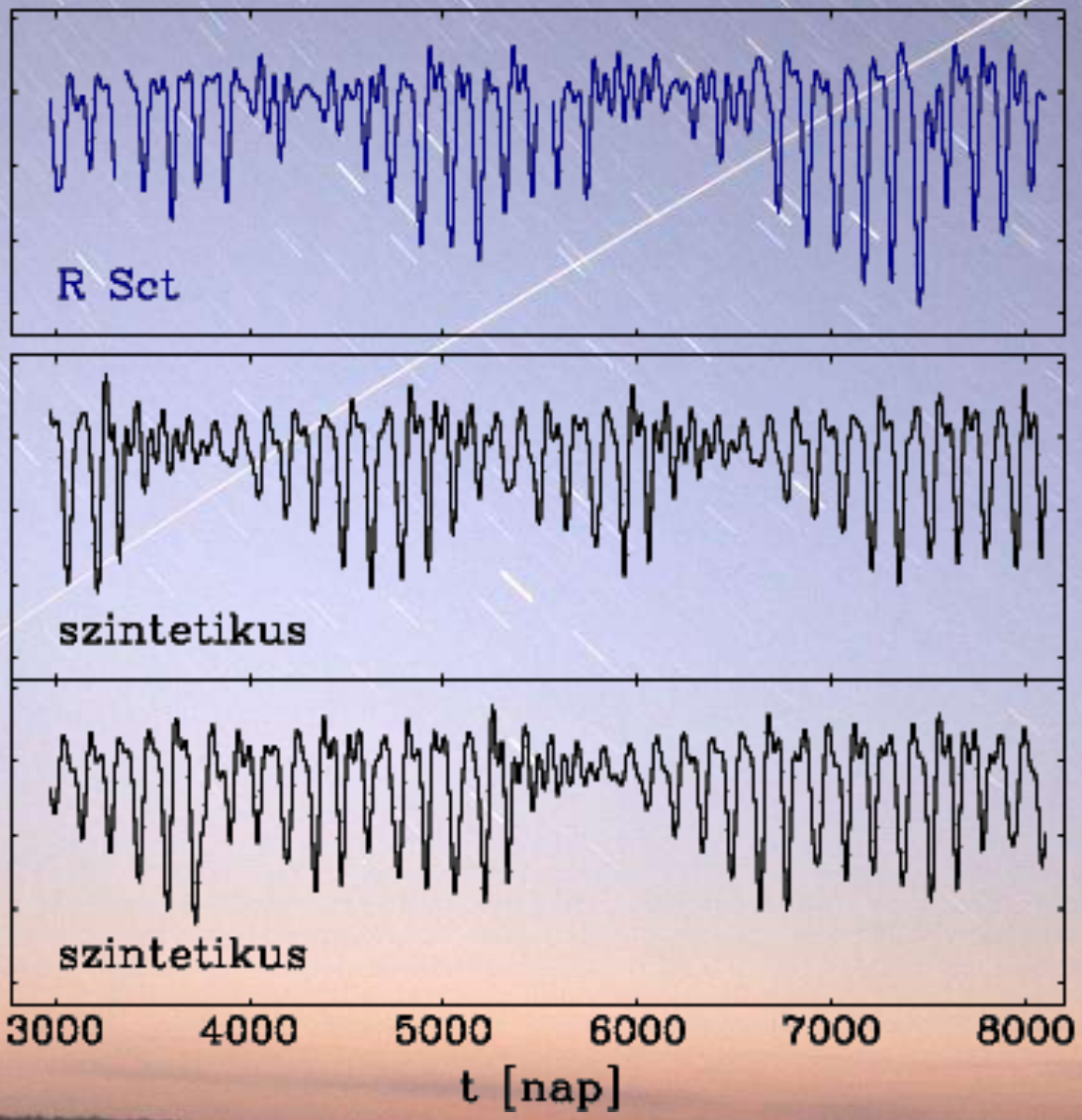


És mindez egy kiállításon...

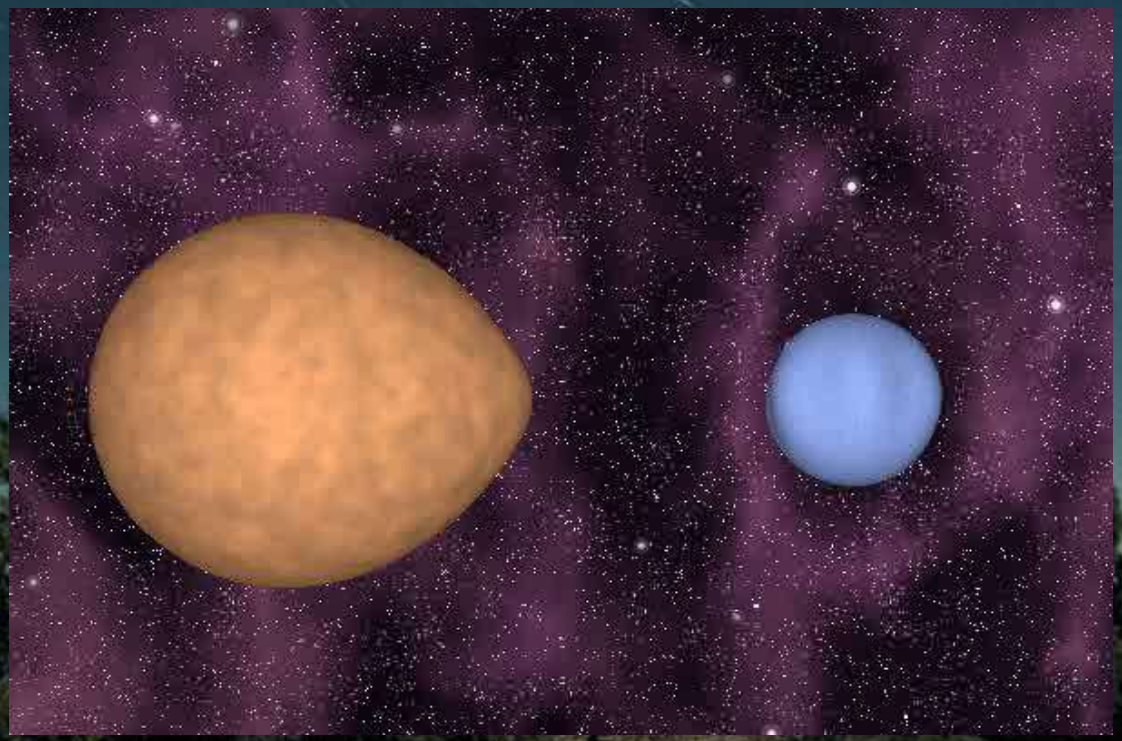
R Scuti

Fénygörbe:

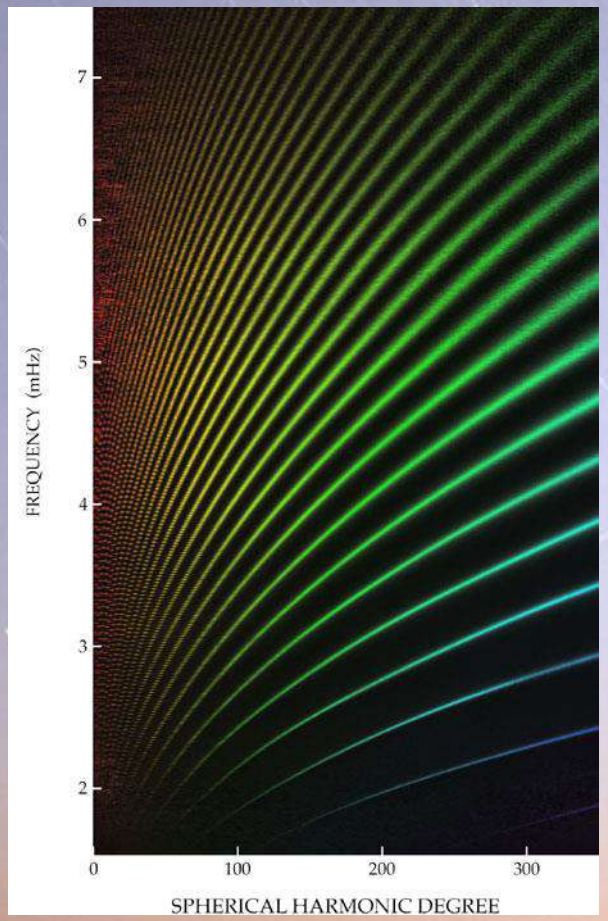
Modell görbék

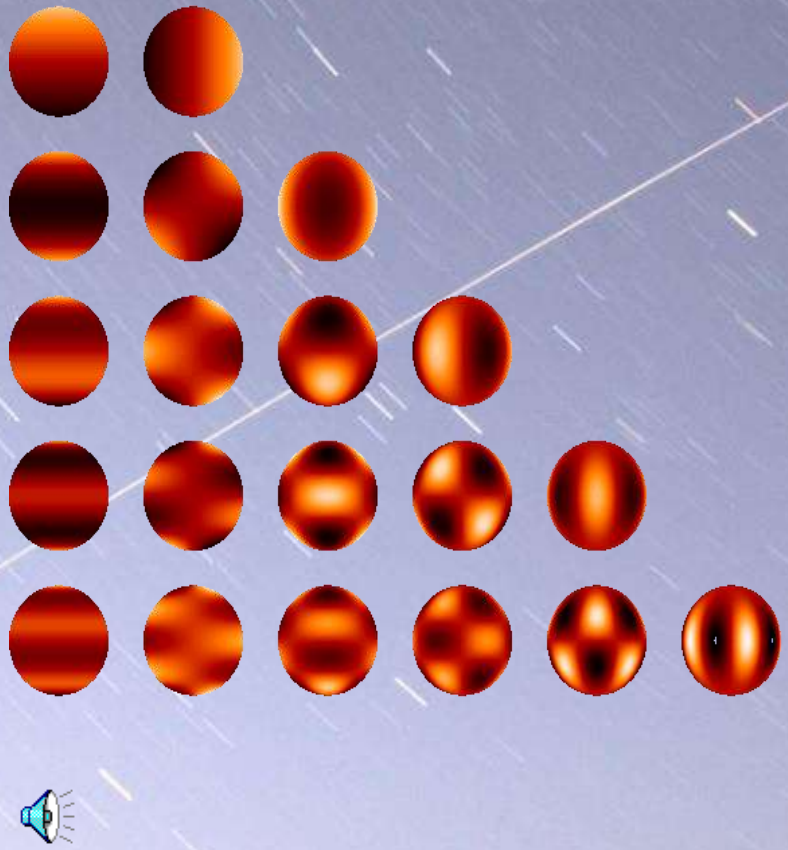


Összetett csillaghhangok



A Nap rezgései





RR Lyrae model

RRd (kétmódusú RR Lyrea)

Blazhko RR Lyrae

δ Scuti csillag: teta Tucanae

HR 1217

HR 3831

Nap rezgési

R Scuti

Kepler: Mars - I

Kepler: Mars - II

Le Weekend 2009

STIRLING'S NO LIMITS MUSIC FESTIVAL

29. 30 & 31 May

TOLBOOTH

Telescope 1

Stirling Observatory, Highland Hotel

Meet at the Tolbooth Box Office at 10.30pm

To commemorate and celebrate the 120 year old telescope majestically housed in the Stirling Astronomical Society observatory, perched eyrie like at the corner of the Stirling Highland Hotel, Le Weekend has joined forces with the society and commissioned a new piece that explores the sounds of the stars. The new piece will be installed in the observatory for the festival.

Some stars contract and expand at regular rates, making oscillations, which can be detected optically and then turned into sound waves. Working in collaboration with astrophysicist Zoltan Kollath, minimalists Buffalo buffalo have taken some of these extra-terrestrial drones and processed them using the acoustics of the observatory's dome.

Visits to the observatory have been arranged at the following times, meet at Tolbooth Box Office.

Telescope 2

Saturday – 11.45am, 12.30pm, 1.15pm & 10.30pm

Telescope 3

Sunday – 11.45am, 12.30pm, 1.15pm

There are only 8 places available for each performance so please book in advance.

Neil Simpson

Mike Gallagher

Festival Club

Tolbooth bar 10.30pm - 1am

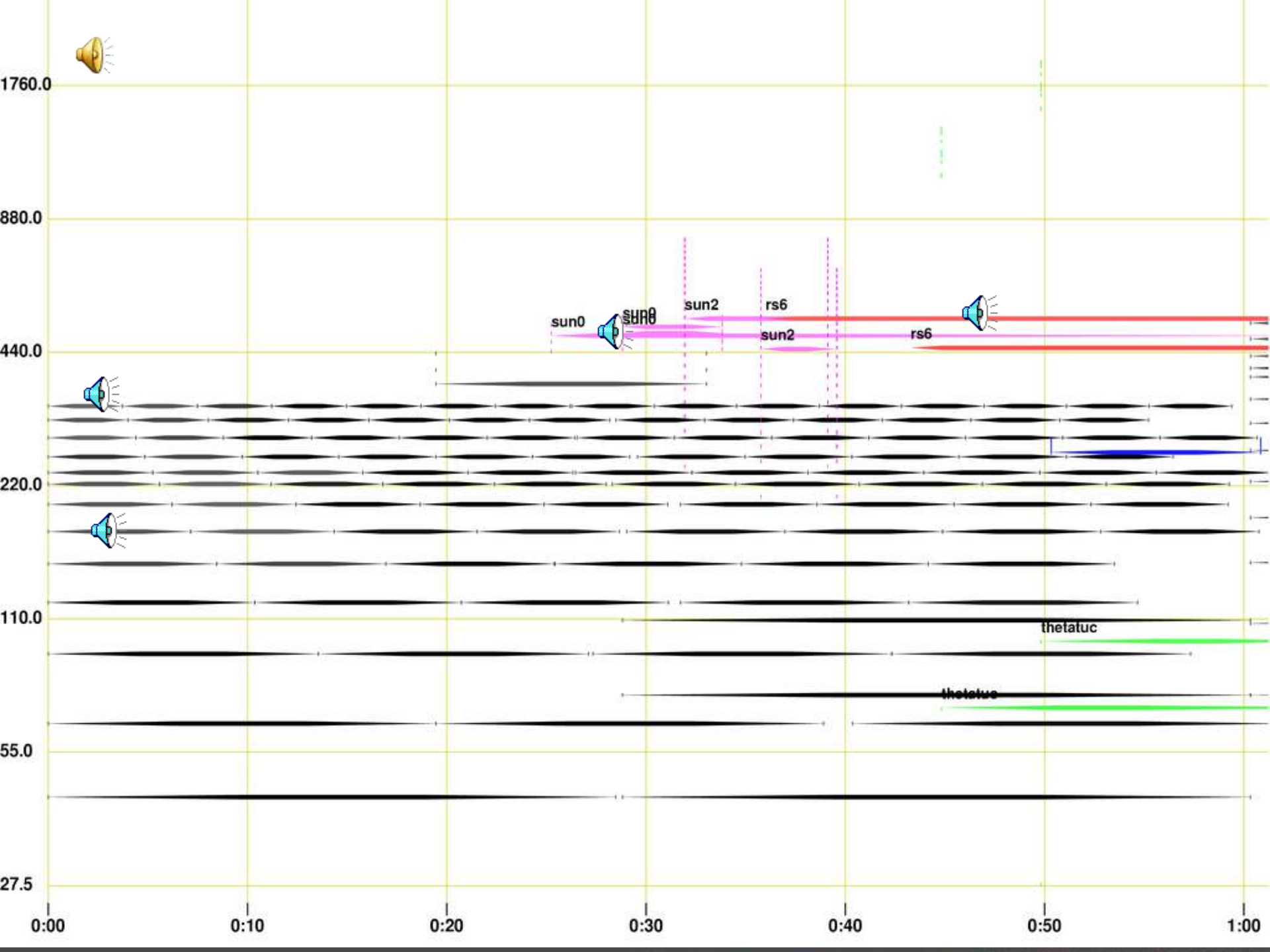
Dj's and happenings in the bar every night


Keuler - Kolláth:
Csillagzene No. 1.
Stellarmusic No. 1


KEULER JENŐ,
Kolláth Zoltán:
Csillagzene No. 1

A zenekar:

- **szürke:** *különös cefeida sorozat*
- **barna:** *csillagharang*
- **piros:** *RS – R Scuti és modelljei*
- **bíbor:** *SUN – naprezgések*
- **zöld:** *θ Tucanae, HR 3831, GD 358*
- **kék:** *HR 1217*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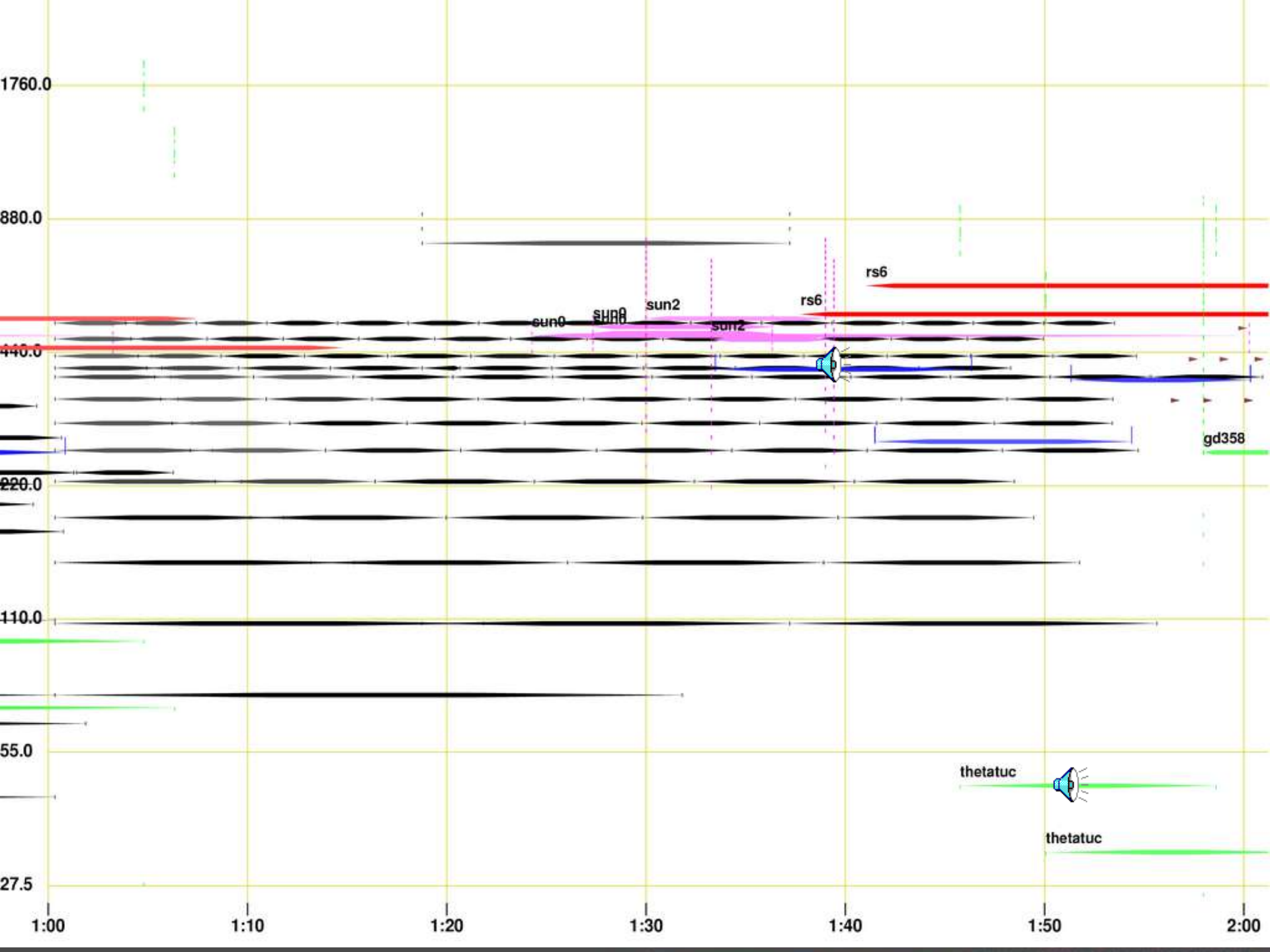
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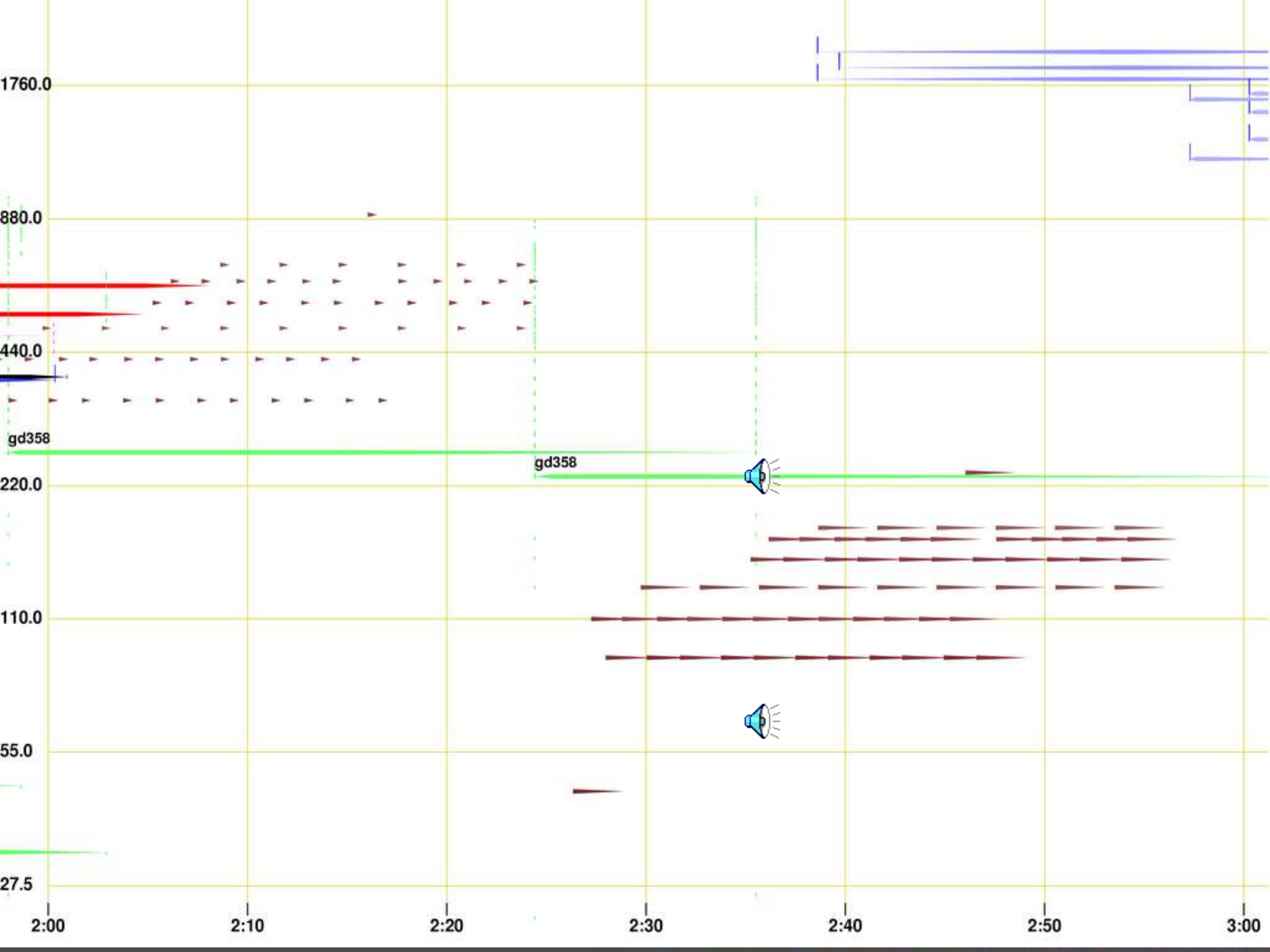
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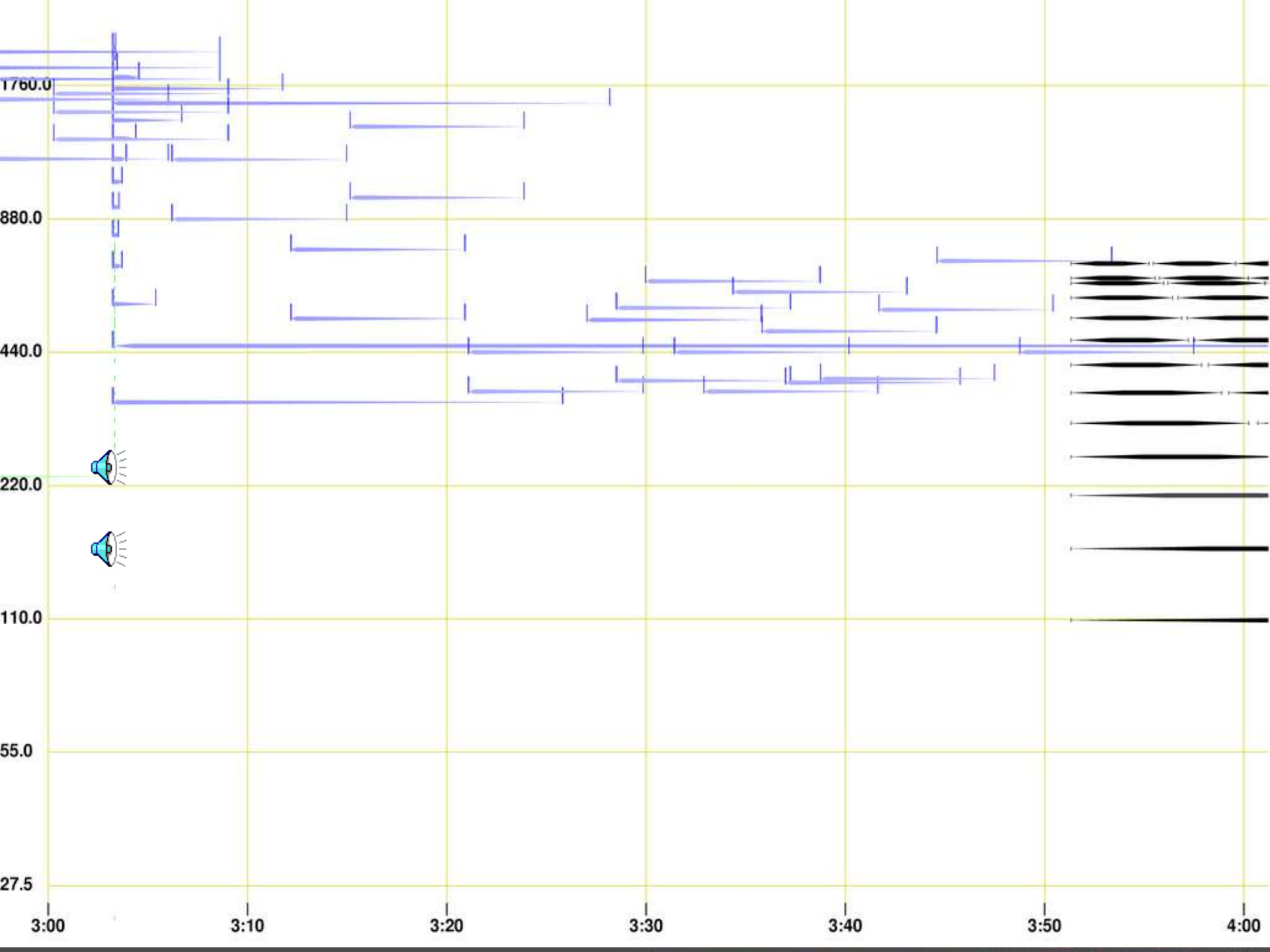
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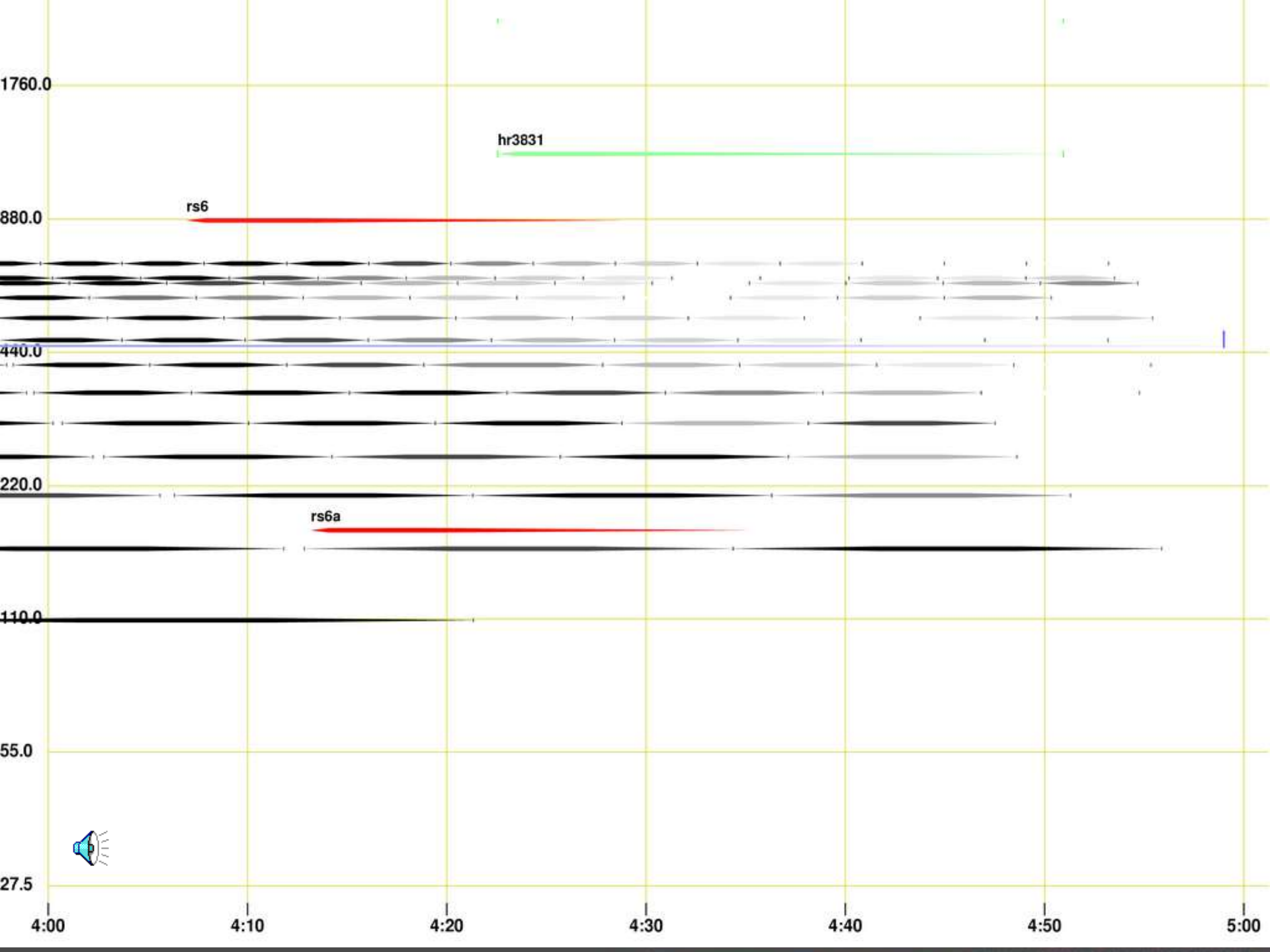
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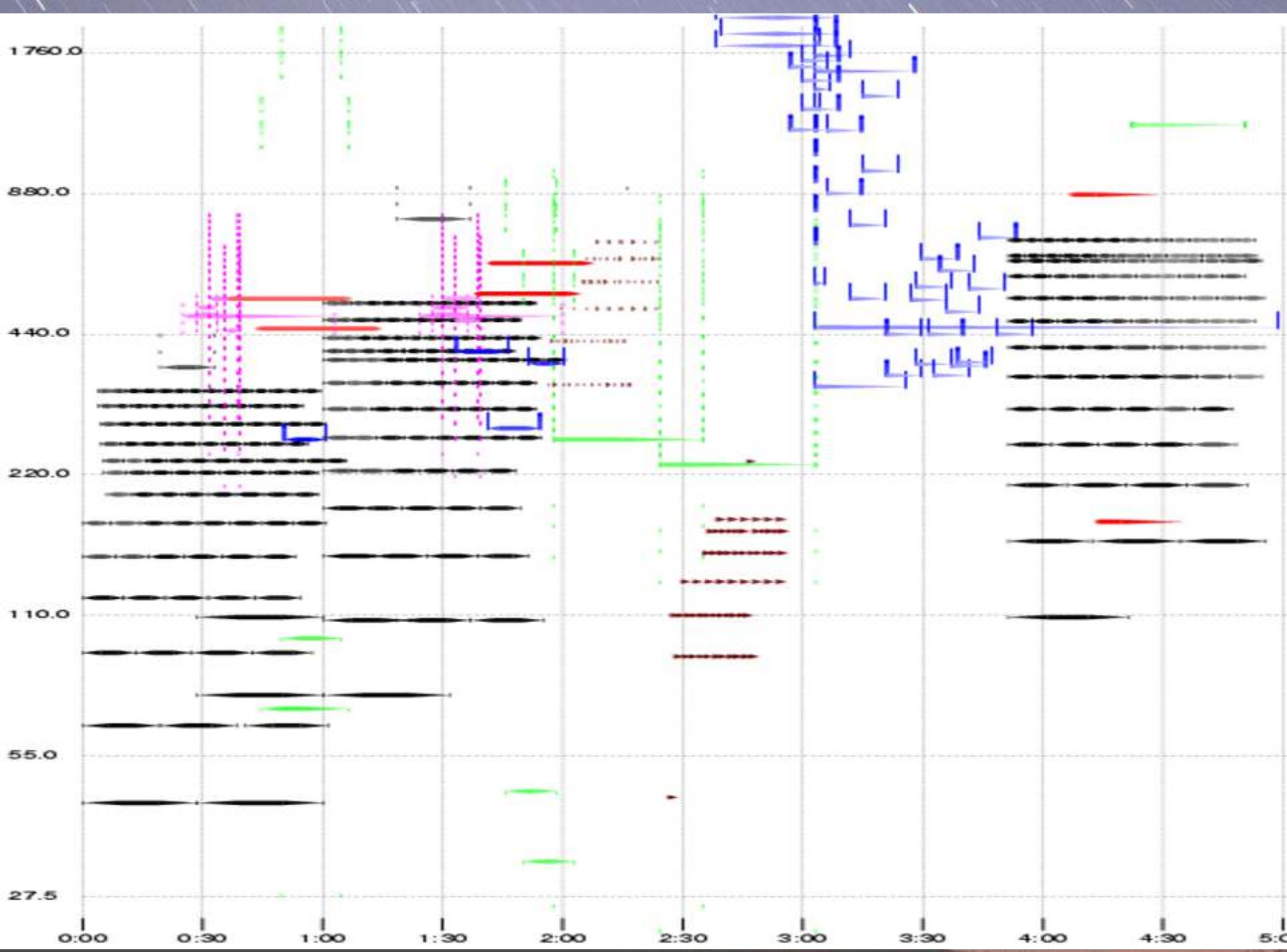
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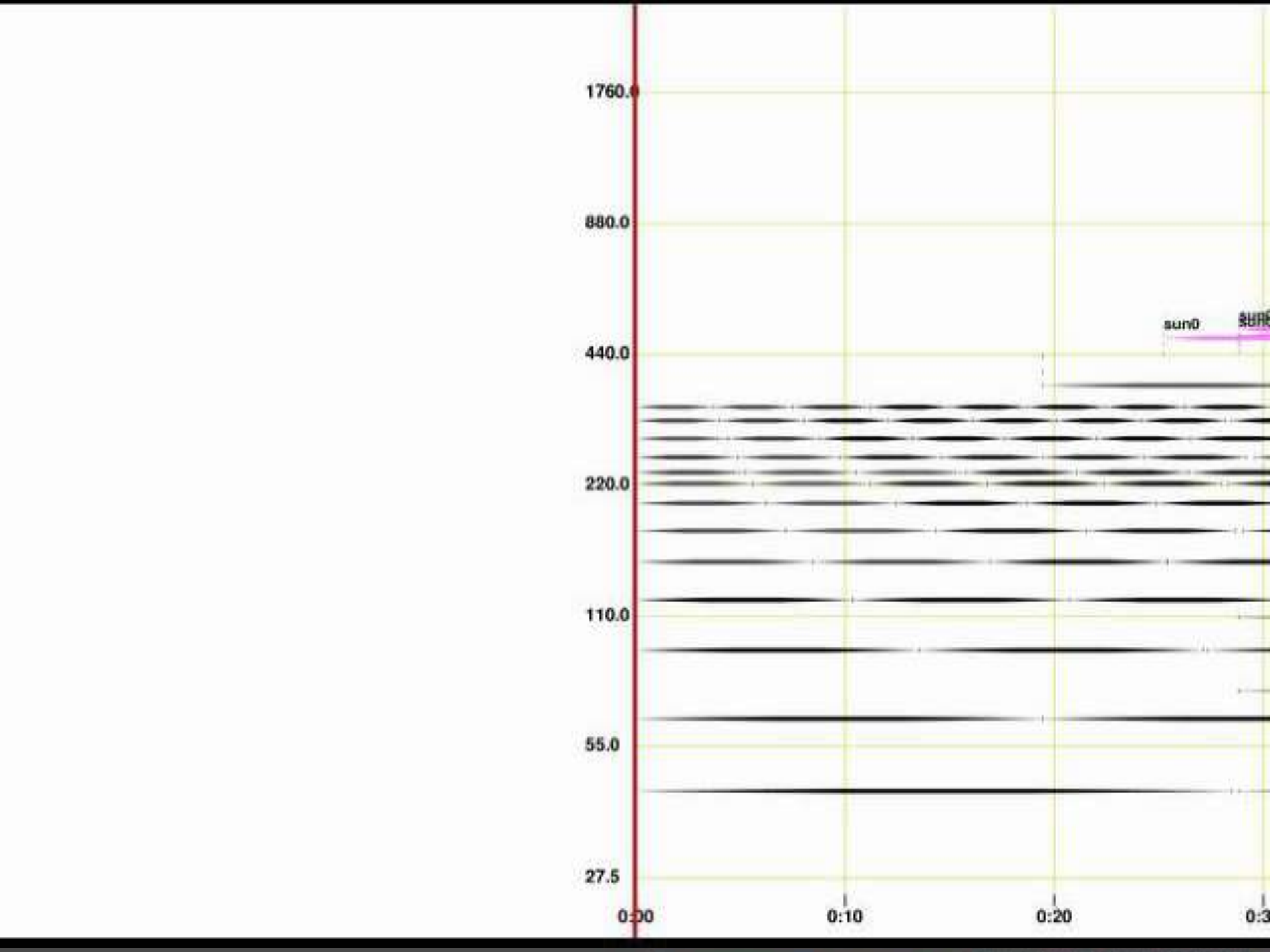
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Köszönöm a figyelmet!