

RADIO ASTRONOMY

In the next 70 Years

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Subjects to be touched

- 70 Years BEFORE Karl Jansky
 - Loomis
 - Popov- the FIRST Radio Astronomer
 - “People-to People”
 - and
 - **“People –to-Nature”**

Mahlon LOOMIS, 1866

Patent, “wireless telegraphy”

(between two kites, 18 miles apart)

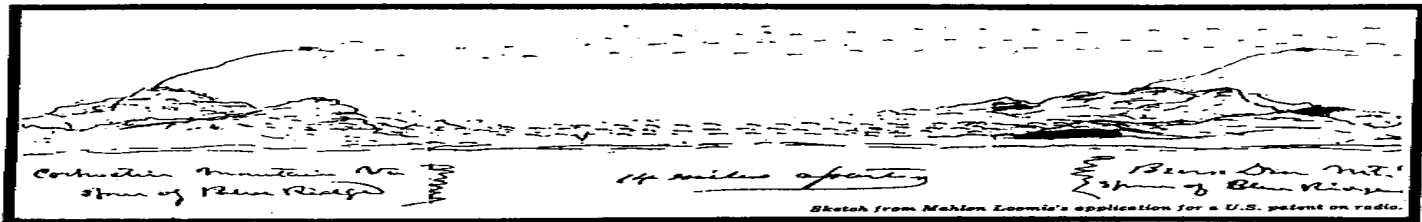


Fig. 1. Mahlon Loomis, employing identical wire aerial systems on two mountain peaks about 32 km apart in the Blue Ridge Mountains of Virginia, demonstrated in 1866, that he could receive pulsations on one peak caused by the making and breaking of the aerial connection to ground on the adjacent peak.

RUSSIAN HISTORY

- Alexander POPOV (patent, “Thunderstorm Marker”, 1897)
- Formal beginning: Solar Eclips in Brazil, 1947
- Names:
 - Semen E. Khaikin,
 - Viktor V. Vitkevich (his student)
 - Vsevolod Troizkij
 - Viktor Ambartsumian
 - Semen Ya. Braude
- Theory: Iosif Shklovsky
 - Vitalij Ginzburg
 - Solomon Pikelner
 - Later: Yakov Zeldovich

CONFLICTS history

- Decameters
- M v cm
 - (Vitkevich v Khaikin)
- mm
- Radio:
- External v Internal
- (Merging v “D-body”)
 - or
 - Shklovskij v Ambartsumian
 - (Igor Novikov mission)
- Today theory: both were correct!

Main discoveries

- HOT CORONAS, 1947
- IPS (50th)
- CRAB nebulae- synchrotron manifestation
(polarization)
- Recombination lines:
 - New theory (N.Kardashev, 1958)
 - First dicoverry (A. and Z. Dravskich, 1963;
R.Sorochenko, 1964;)

TARGETS v FACILITIES

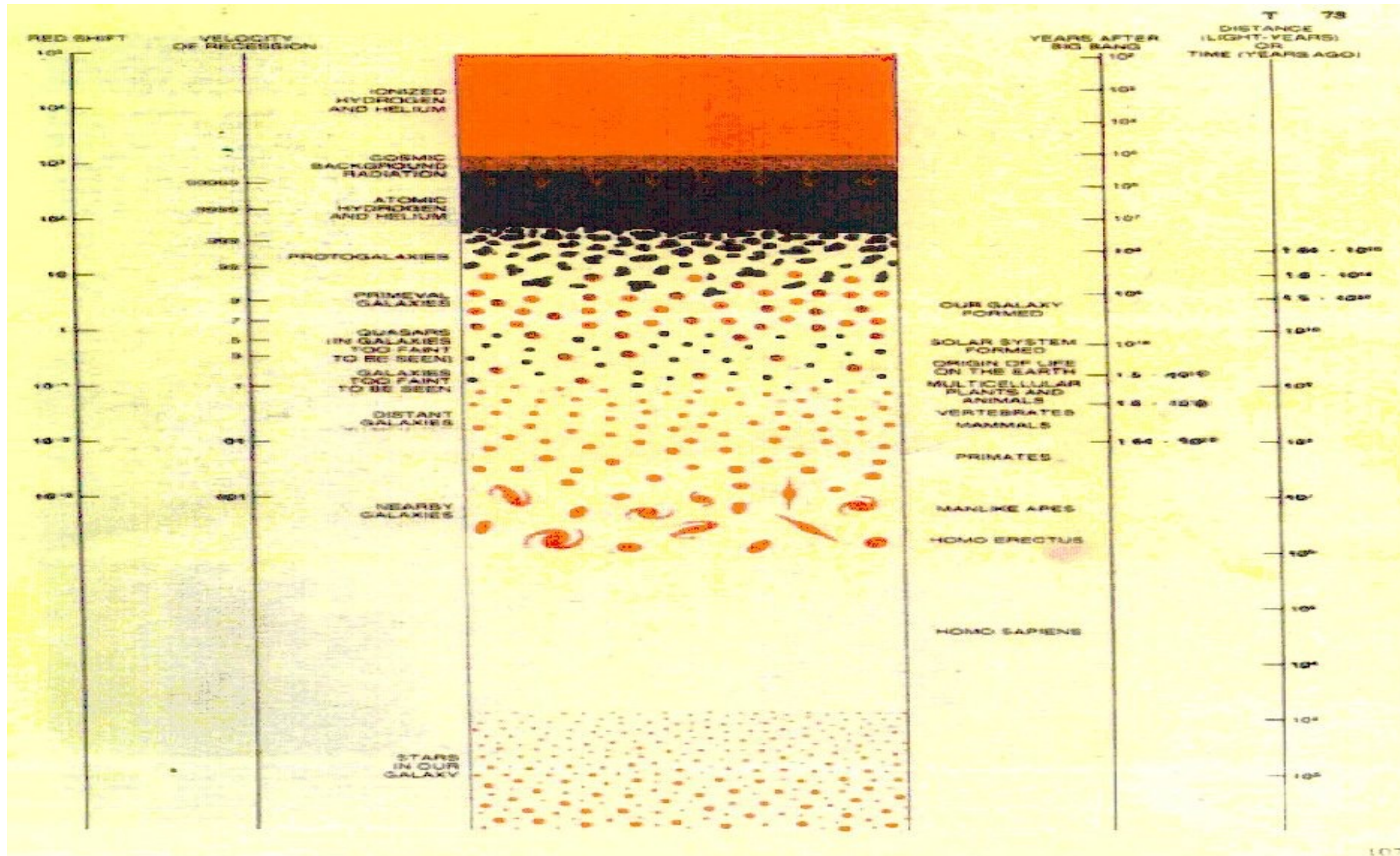
- **Difficulties with TARGETS**

- (M.A.Markov test)

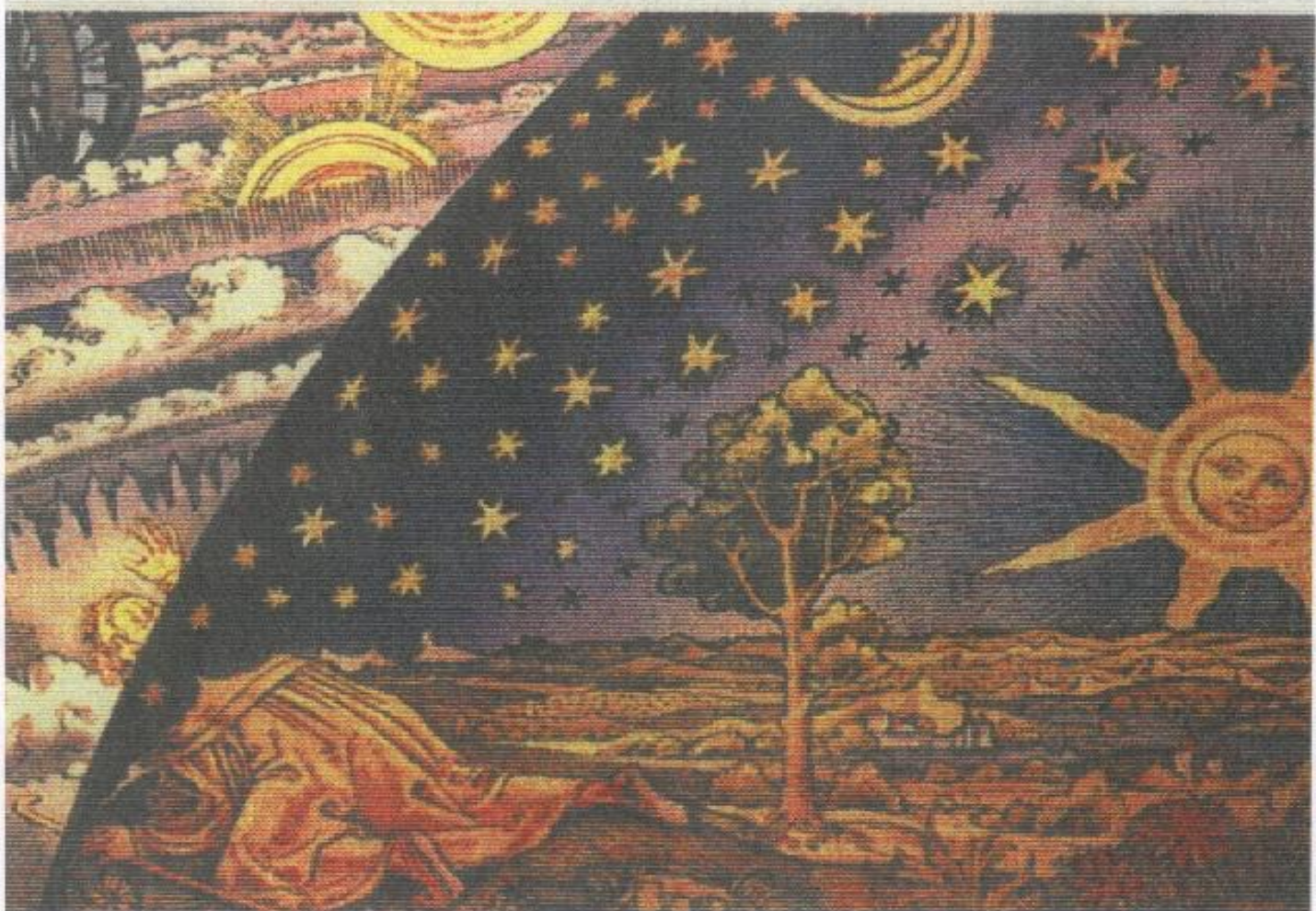
- **Better with FACILITIES**

- (more or less predictable EXPONENTIAL growth)

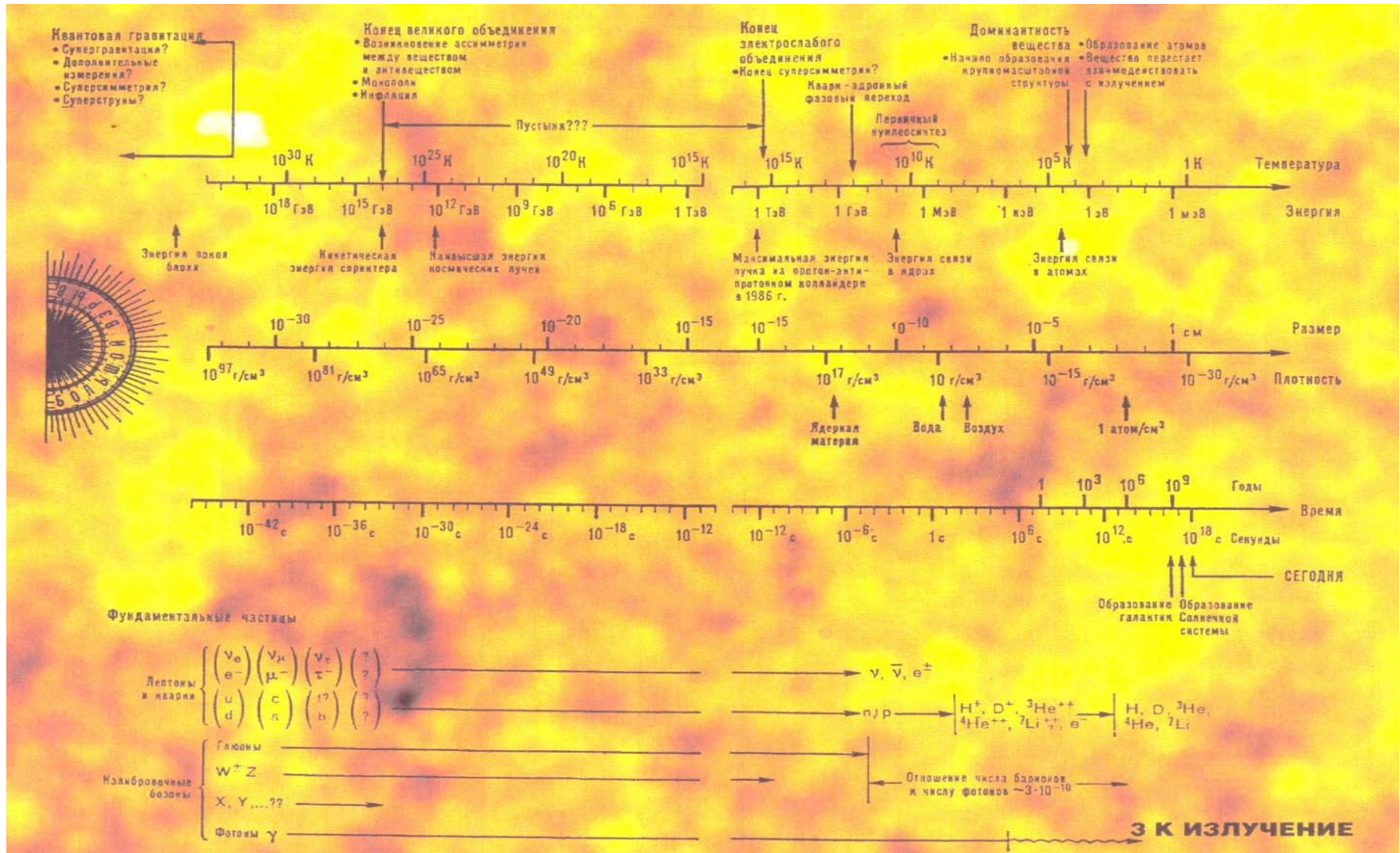
Universe



From OBJECTS to PROTO-OBJECTS



Radio Astronomy and new Physics



New TARGETS

From UNI-verse

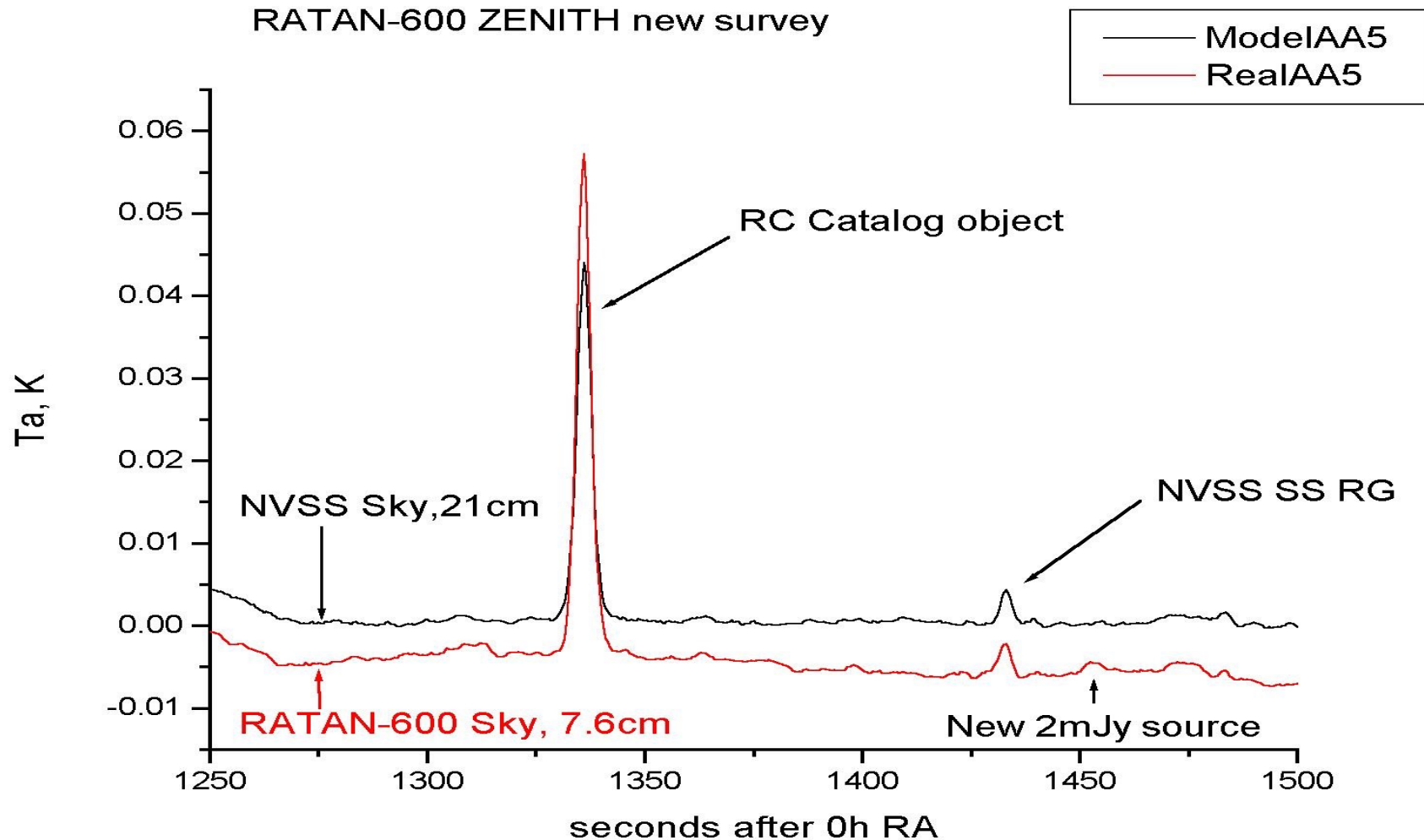
To

MULTI-verse

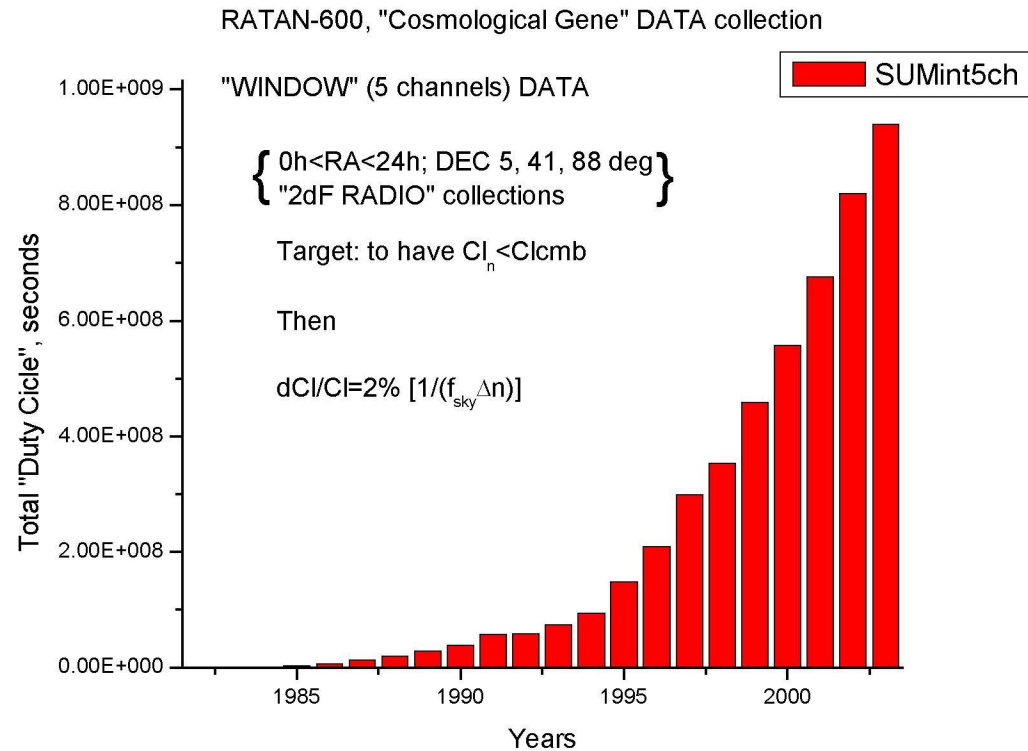
RATAN-600 and TERABITS channel to the DARK AGES



Dm(NVSS) SKY versus Cm(RATAN-600) SKY



RATAN-600 data accumulation process

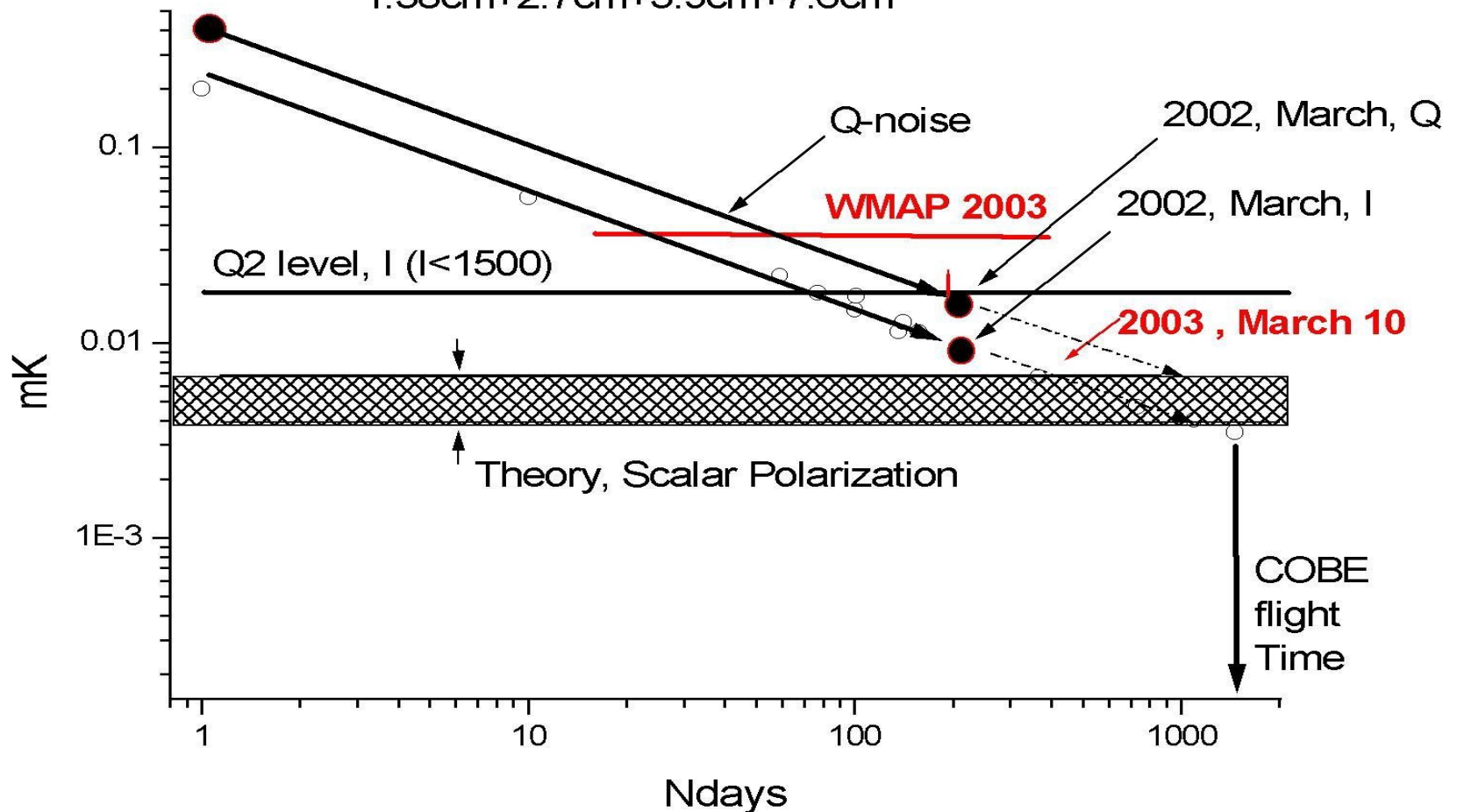


“Cosmological Gene” project

Cln---Ccmb way

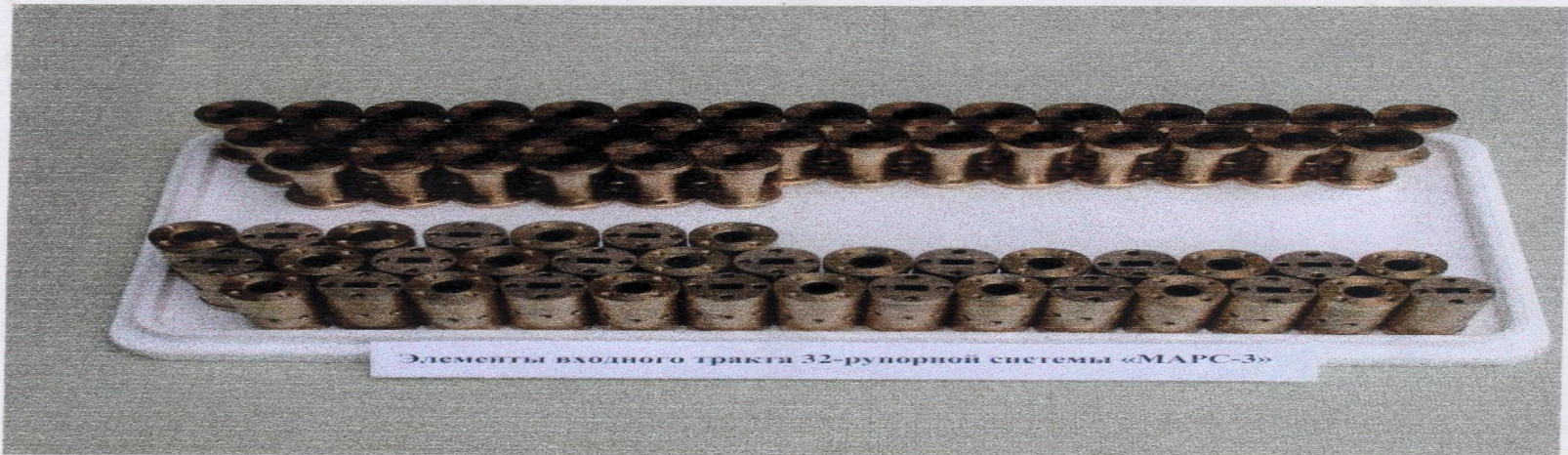
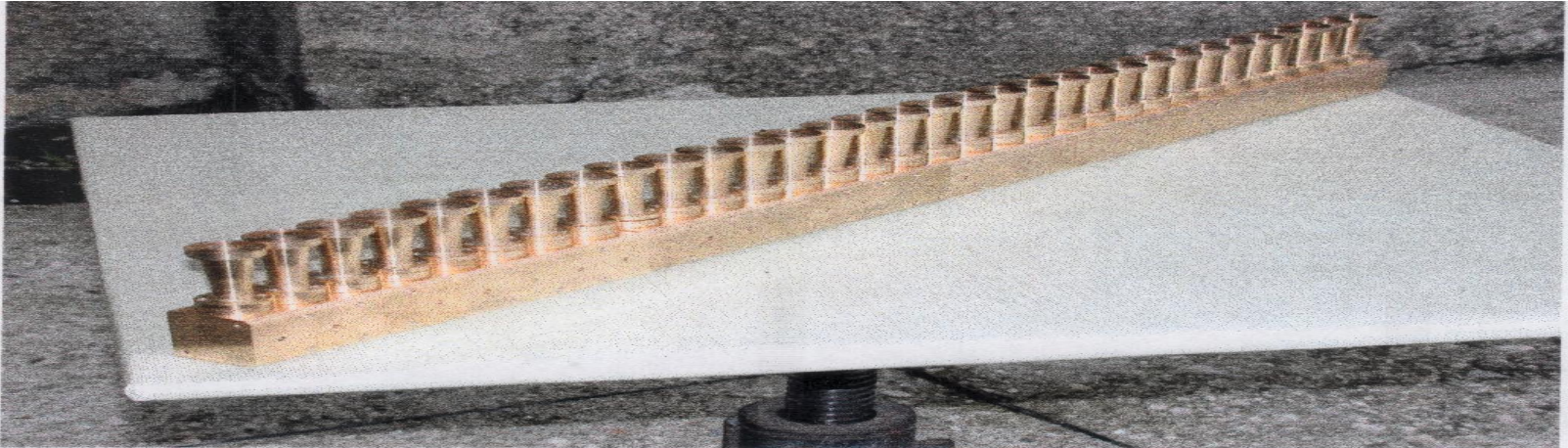
RATAN-600 ZENITH Experiment
Receiver **white noise** component
1.38cm+2.7cm+3.9cm+7.6cm

○ s4yl500N4

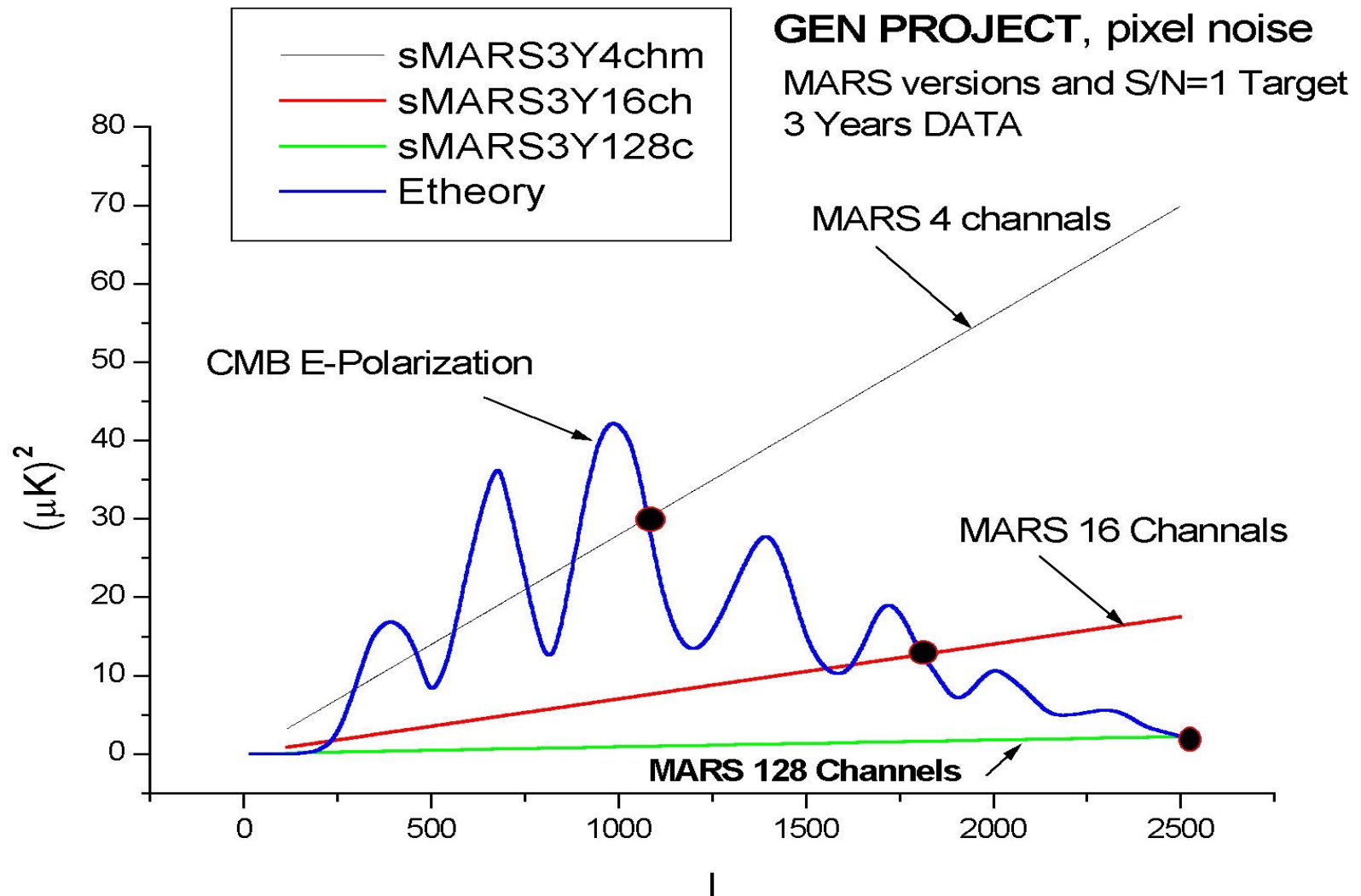


“TERA-BITS” Channel to Early Universe, RATAN-600 solution

Up to 5000 receivers can see the same SKY pixel

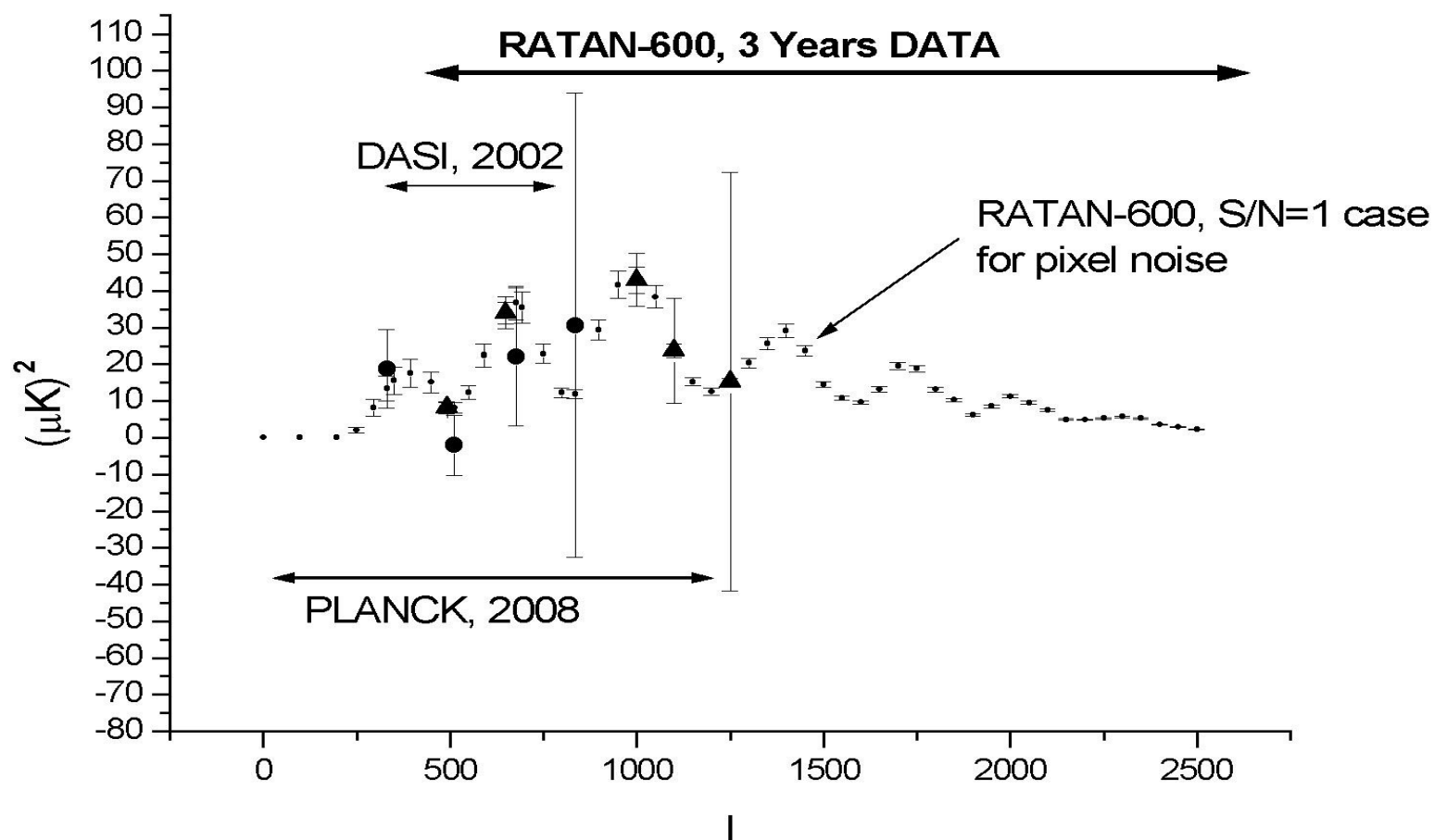


RATAN-600 CMB pol experiment in progress



RATAN-600 CMB pol target

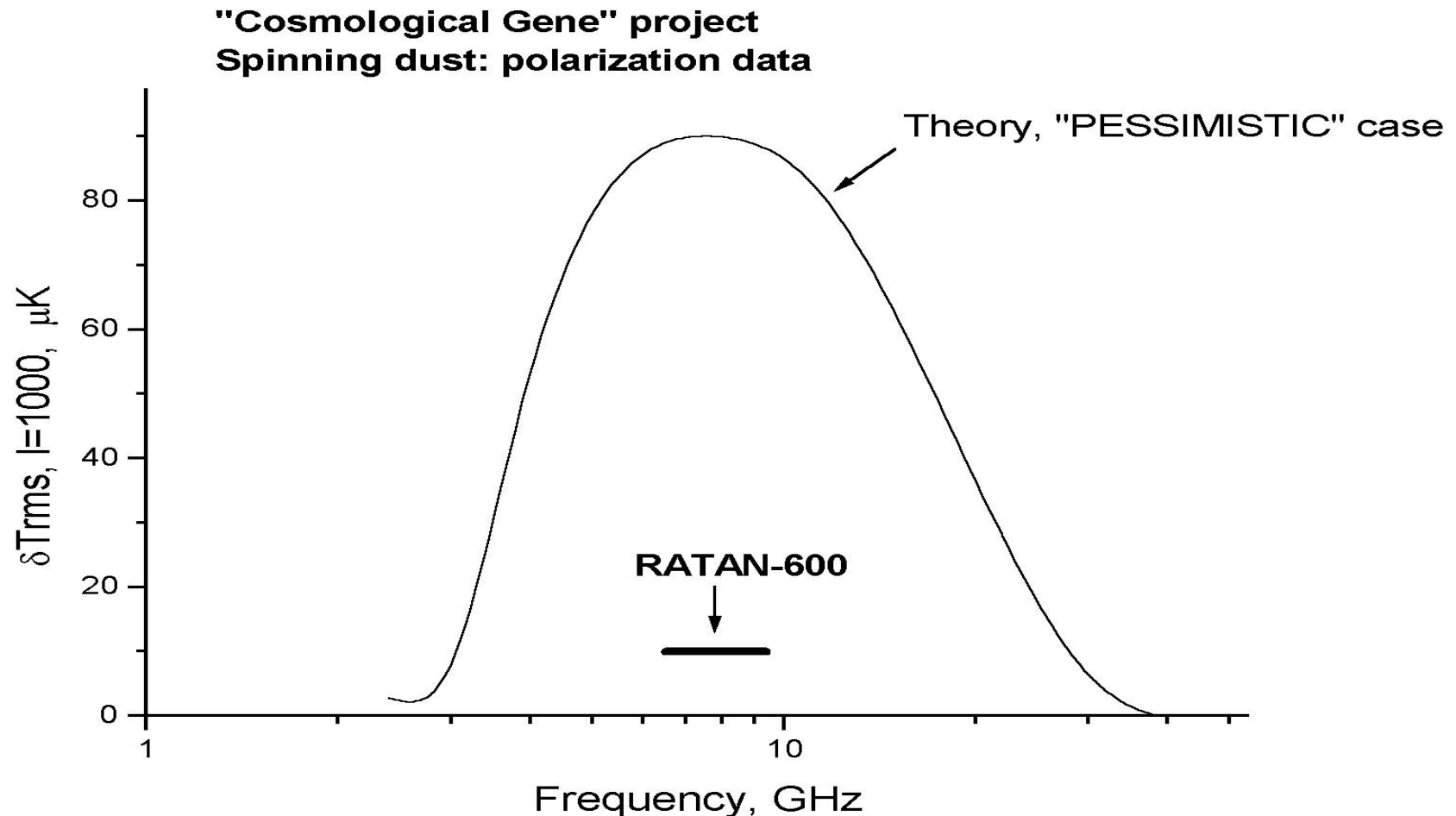
CMB "Sakharov Oscillations",
Polarization, E component



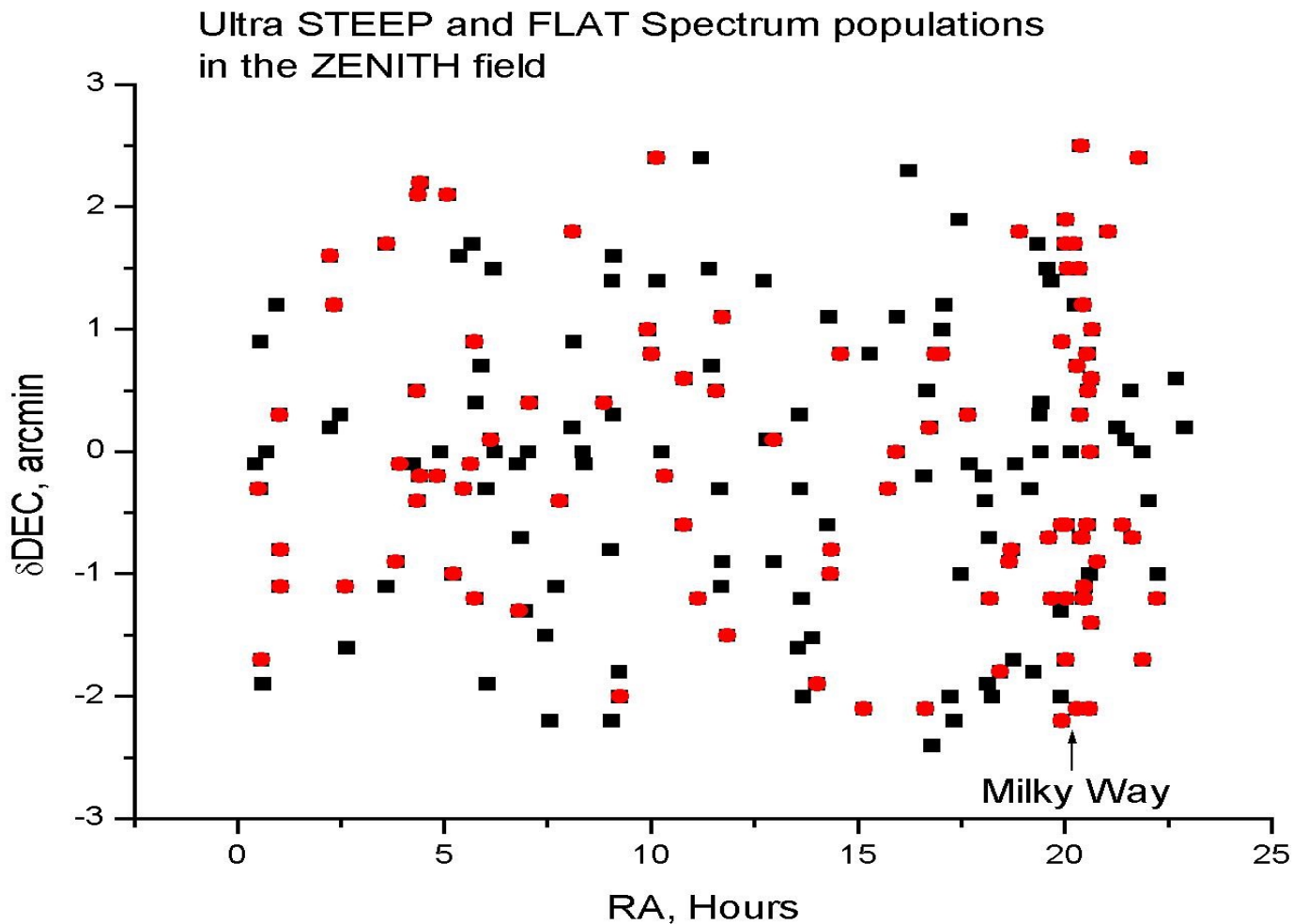
RATAN-600: Galaxy pol at 3.9cm

Much below PLANCK GROUP

“PESSIMISTIC” variant

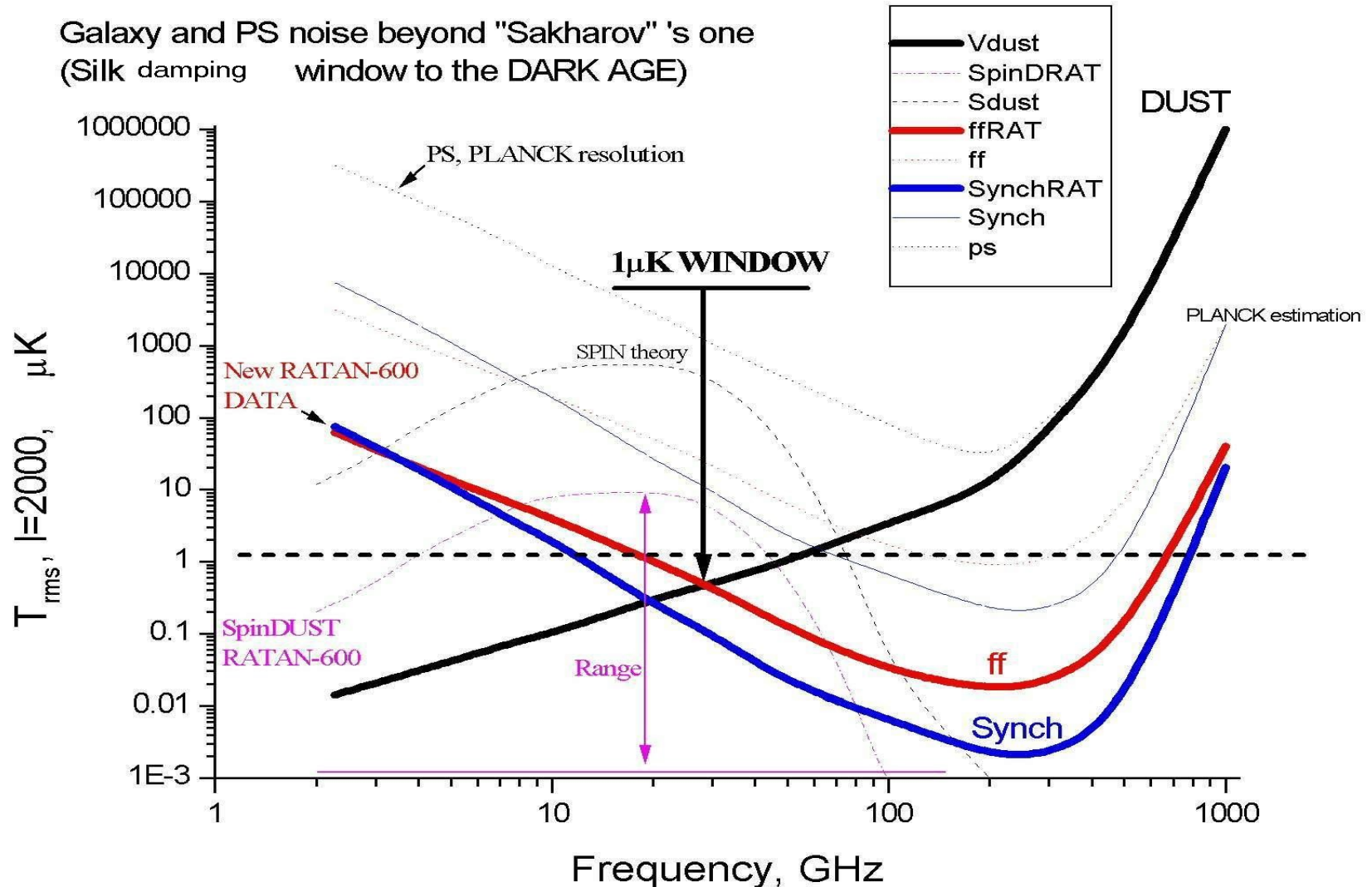


PS at cm with NVSS sensitivity (up to 150micro-Jy per beam)

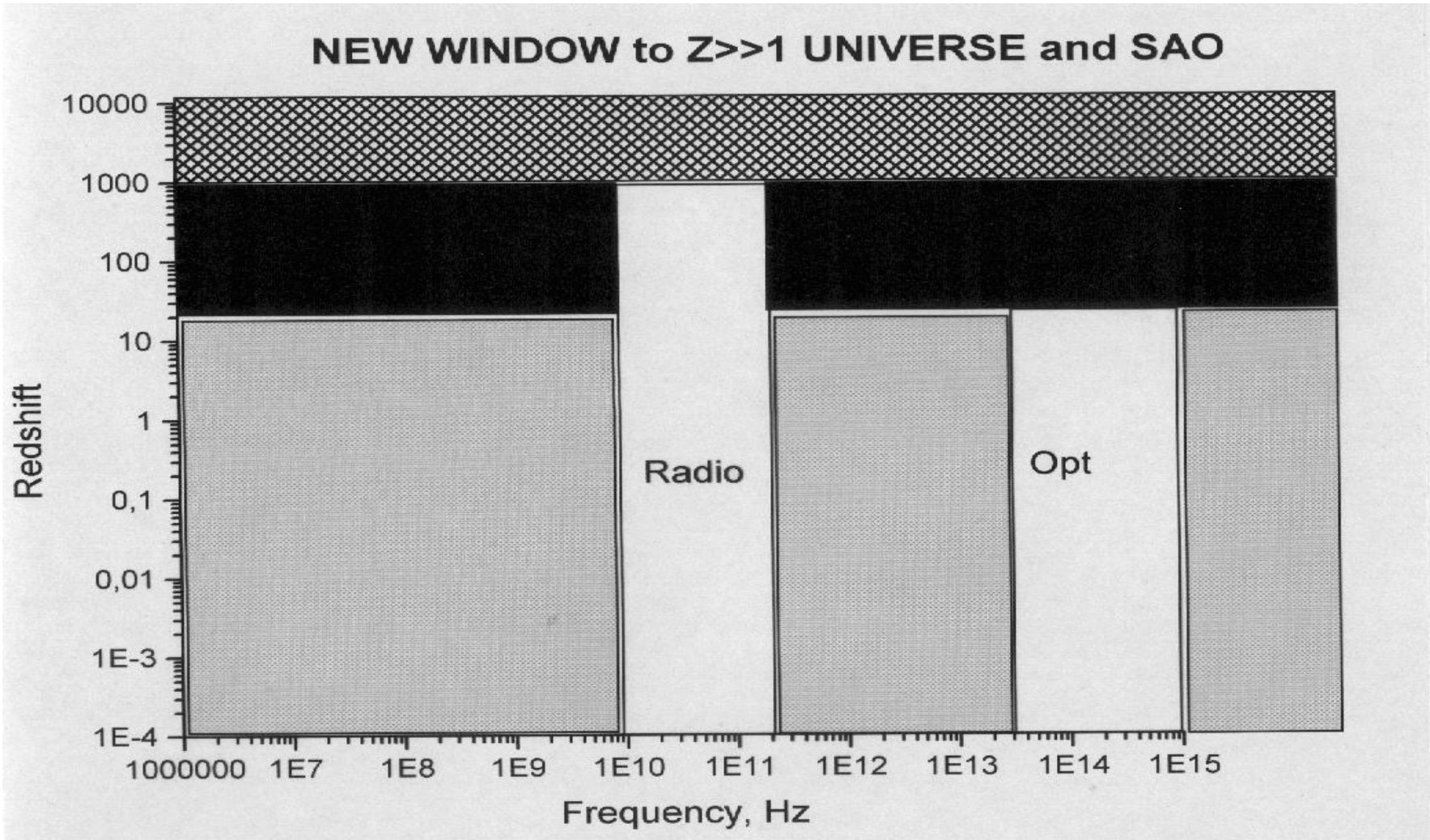


Deepest window to the Early Universe

Galaxy and PS noise beyond "Sakharov" 's one
(Silk damping window to the DARK AGE)



“DARK AGE” and beyond

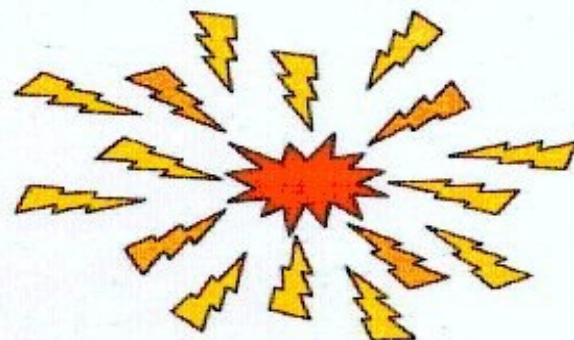




ATMOSPHERE



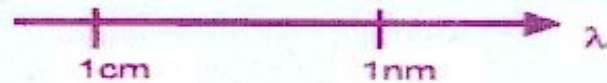
CIVILIZATION



METAGALAXY



SUPERCIVILIZATION



Ideal solution

- Classical approach- coherence properties of the Universe radiation field

$$\Gamma(P1,P2, \tau_{12})$$

“Quantity-Quality JUMPS”

- From MILKY WAY to the END of LUMINOUS Universe
- From FINAL RESULT to INITIAL CONDITIONS
- From OBJECTS to the PROTO Objects
- From D2 to D3 Radio Astronomy
- From From SMALL ADDITIONAL WINDOW to

THE ONLY WINDOW
to the EARLY UNIVERSE

- From RECEIVER NOISE to the UNIVERSE NOISE
- (Confusion– “Sakharov Oscillations” noise...)

Summary

- **1. RADIO ASTRONOMY
SECOND BIRTH** process is visible. Radio may be the ONLY way to solve EARLY UNIVERSE problems (and very HE Physics)
- **2. Nano-arcsec resolution,**

Billion sq.m. Arrays

**Sub-micro-K brightness
temperature sensitivity**

**THESE NUMBERS seems
are UNESCAPABLE!**

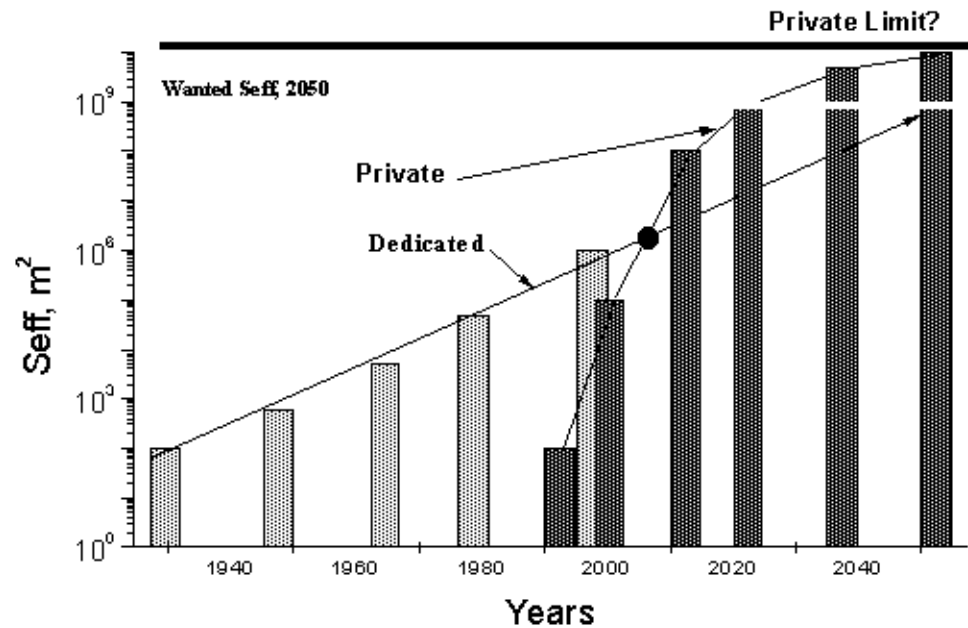
3. Our future depends on the WAY the CIVILIZATION will select:
Go ahead to “HOMO SAPIENCE” or
BACK TO “PRIMATES”

4. People-to People communication investments SHOULD BE USED for Radio Astronomy!

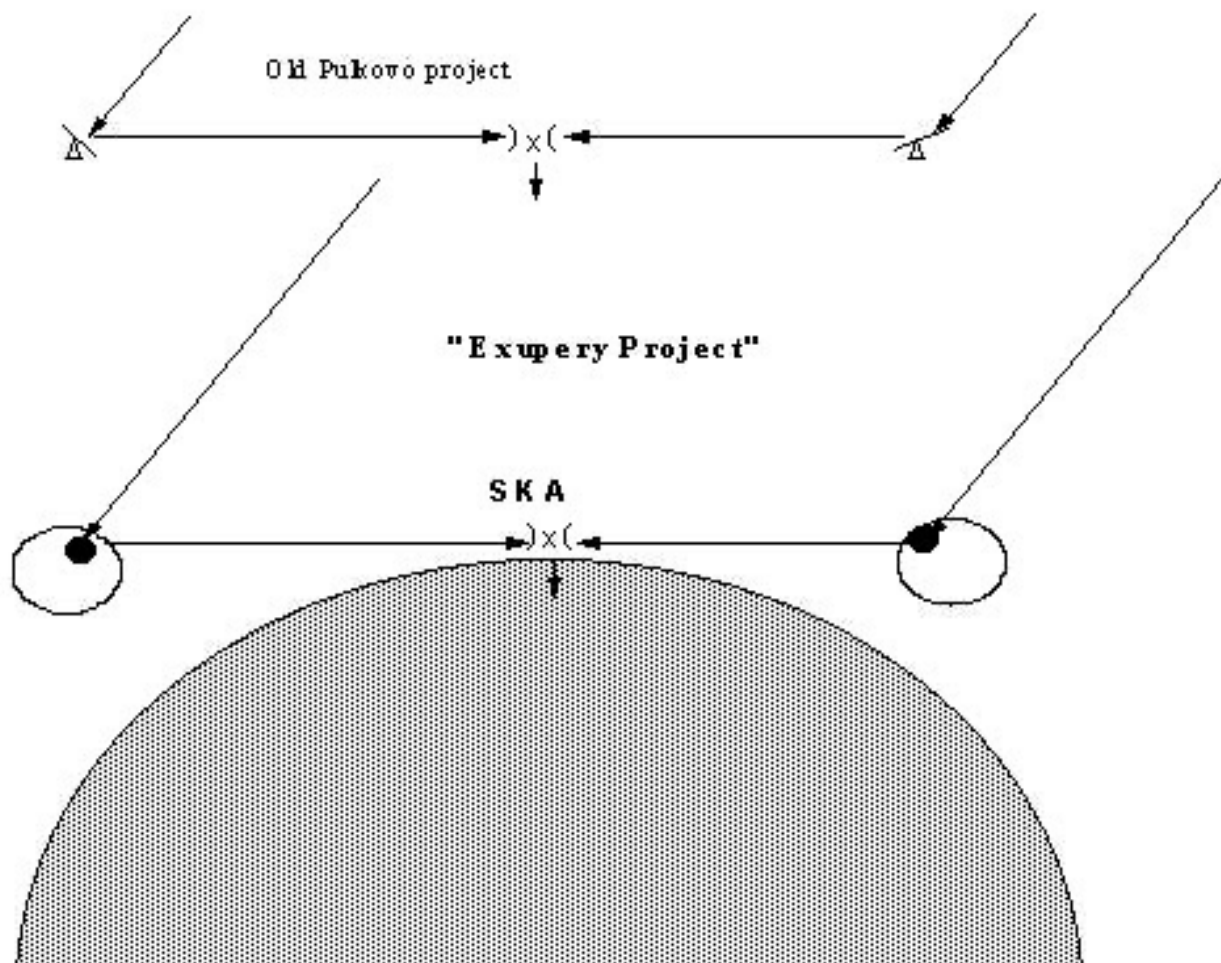
Amature Radio Astronomy may have facilities greater than **DEDICATED** one.

**Not money, but propaganda
of SCIENCE will be the
main job**

PRIVATE versus DEDICATED Facilities



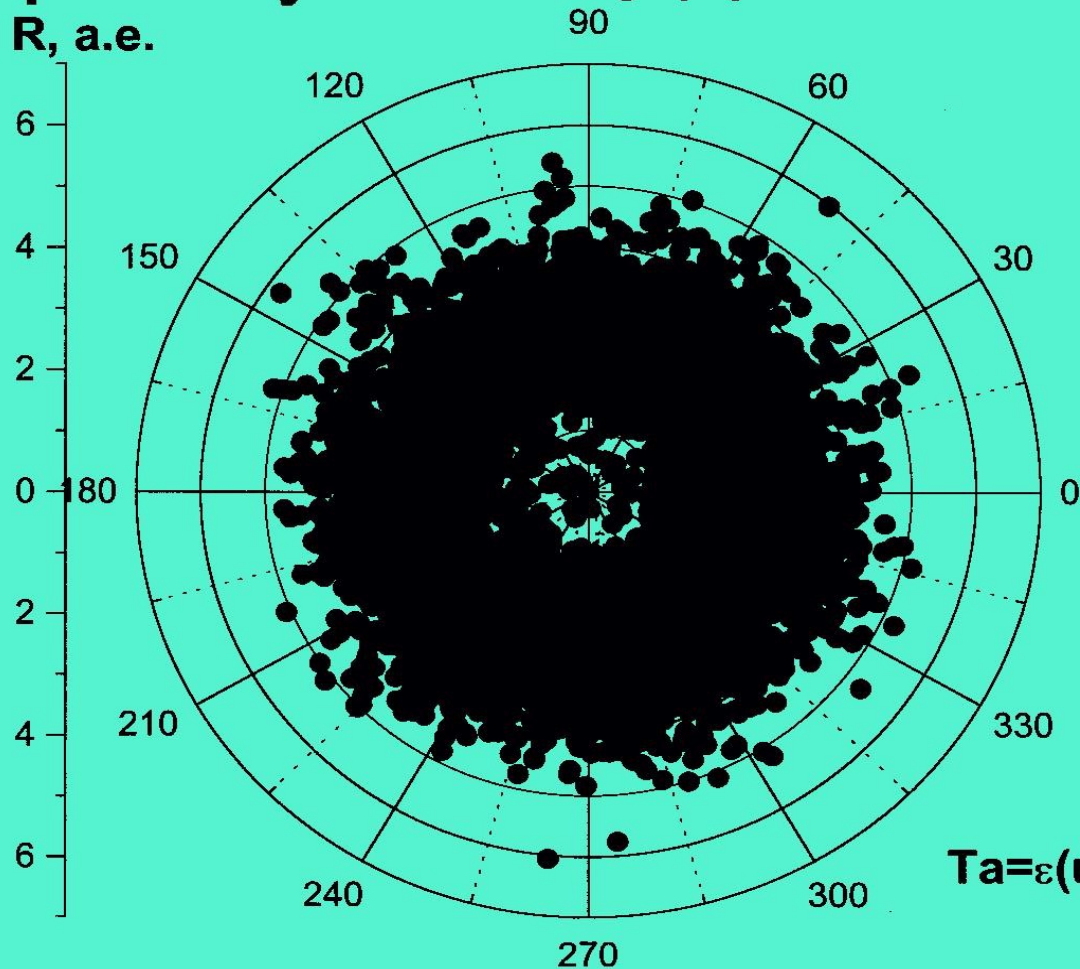
Asteroids First FREHNEL ZONES as reflectors



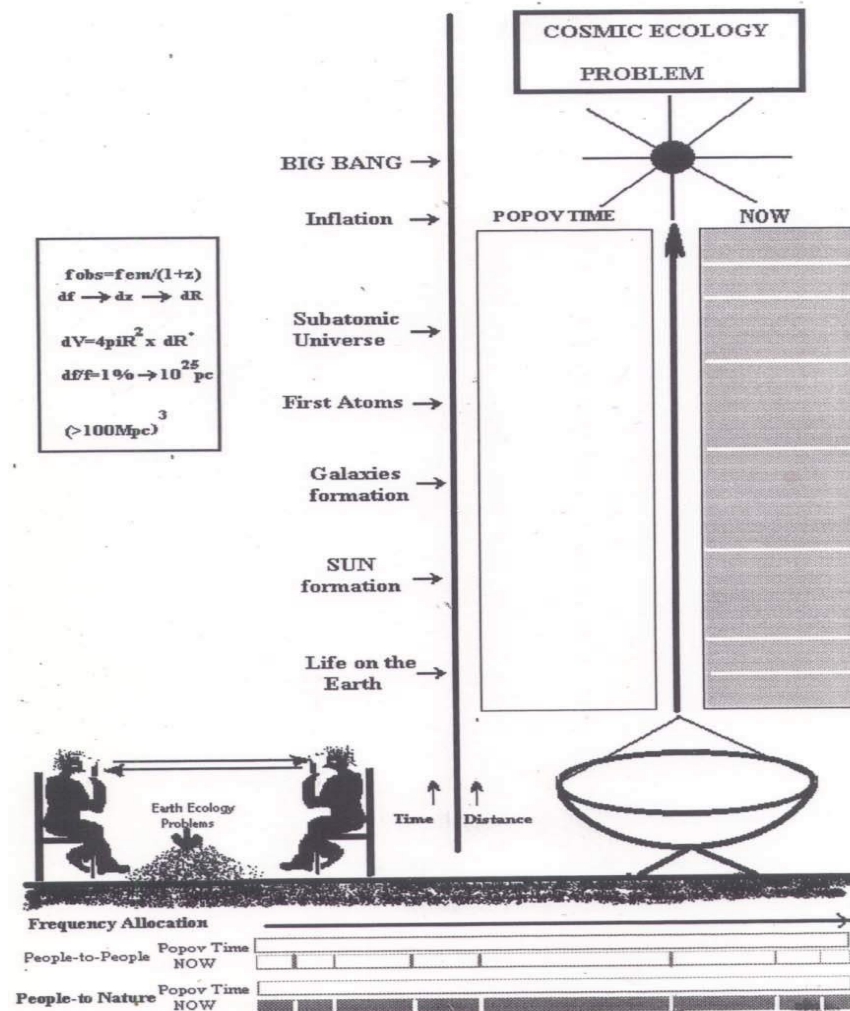
“Natural solution”

Ecliptic Array and 3D Holography of the Universe

R, a.e.



People-to-People against People -to- Universe



“DARK EPOCH” of CIVILIZATION

- From
- **“WE KNOW EVERYTHING**
 - about
 - **NATURE**
- To
- **WE KNOW NOTHING**
 - about **NATURE...**