

EVOLUTION OF THE UNSOLVED PROBLEMS

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I would like to trace the evolution of the major problems or questions since the 1950's by showing several diagrams (Fig. 1a–e) based on my own recollections. As for the coordinates of the diagrams, the latitude towards North indicates the magnitude of surprise and that towards the South indicated is the deepening of our knowledge. Of course such a visual approach is incomplete and is full of personal prejudices, and many important subjects and considerations may be missing.

I will not go into detail of the interpretation of the diagram. But from the series of the diagram we may see that unification and diversification of the questions alternate as one of our co-panelists, Freeman Dyson, pointed out in one of his inspiring books.

In the 1970's to the 1980's we had good hopes that GUT would develop and in its evidence mono-poles and Proton-decay's would be discovered and that proposed candidates of the dark matter may also be discovered from fairly reasonable particles to much more exotic particles.

Now, as of 1990;

1) COBE showed that the 3K sky is very smooth, whereas we see also the violent superstructure of the Universe.

2) Neither, the mono-poles nor p-decay's have yet been discovered.

3) The jet is a common phenomenon at a variety of hierarchies of the universe.

4) GINGA, succeeding the EINSTEIN Observatory explores AGN, and 50% or more of CXB (Cosmic X-ray Background) may be interpreted in terms of a collection of AGN, leaving the paradox of the spectrum unresolved.

5) All candidates of the dark matter appear to have disappeared.

6) Superstring is now in the hands of mathematicians and slipping out of the hands of physicists.

7) X-ray and Gamma-ray Astronomy show that the Neutron Star is very much like it was thoroughly expected to be.

8) Theory's of the evolution of the Universe have so developed into two extremes; the "East" theory which assumes the evolution is from the large scale to the small scale and the "West" theory which says the Universe evolves from small scale to large scale. Each has its own serious difficulties.

Maybe, the real question now is "Why are things becoming so normal and, say, dull, while 10–20 years before God brought many surprises, a variety of breaks in symmetry"?

Current experimental and observational programs are also indicated in the diagram (Fig. 1f).

Major Unsolved Problems in Astronomy

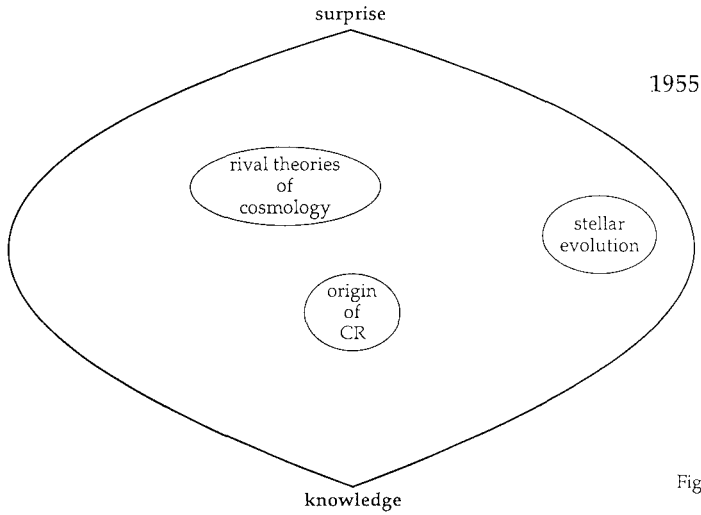


Fig. 1 a

Figure 1a.

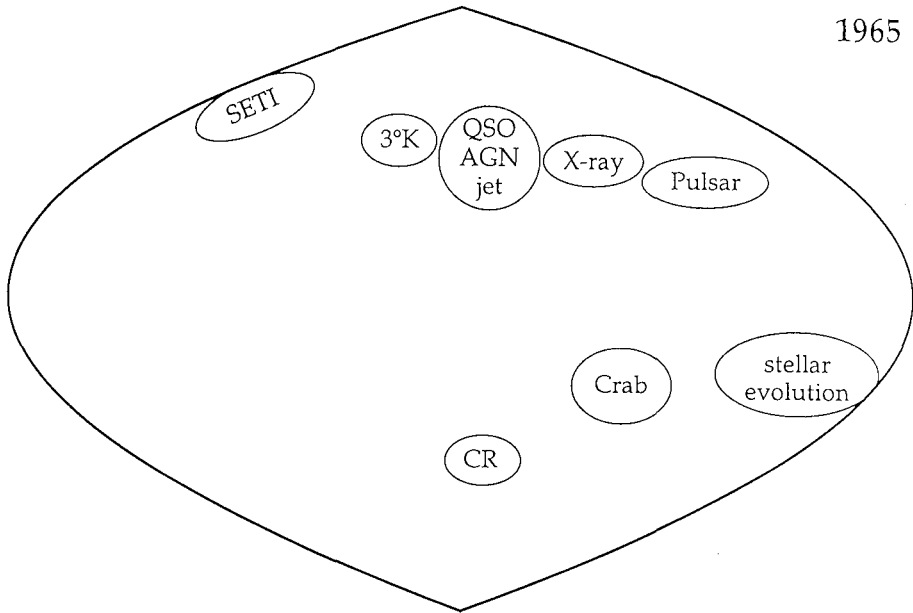


Figure 1b.

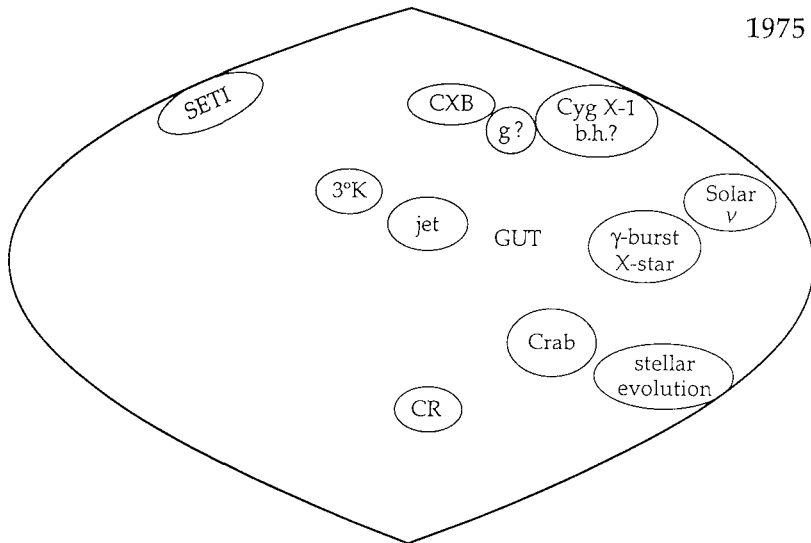


Figure 1c.

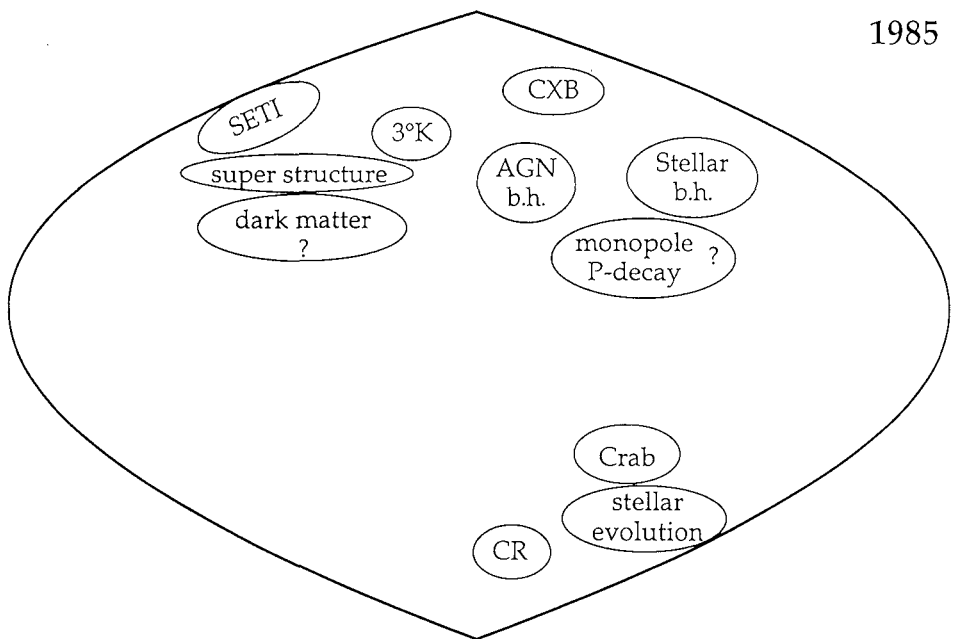


Figure 1d.

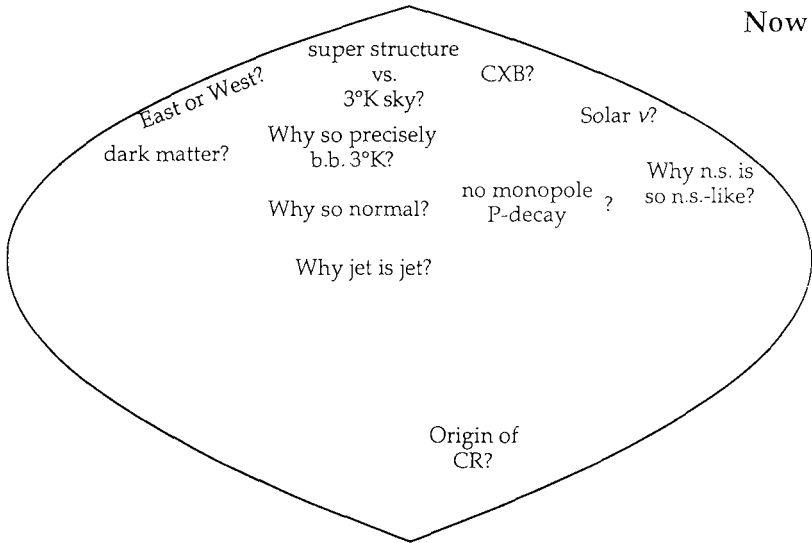


Figure 1e.

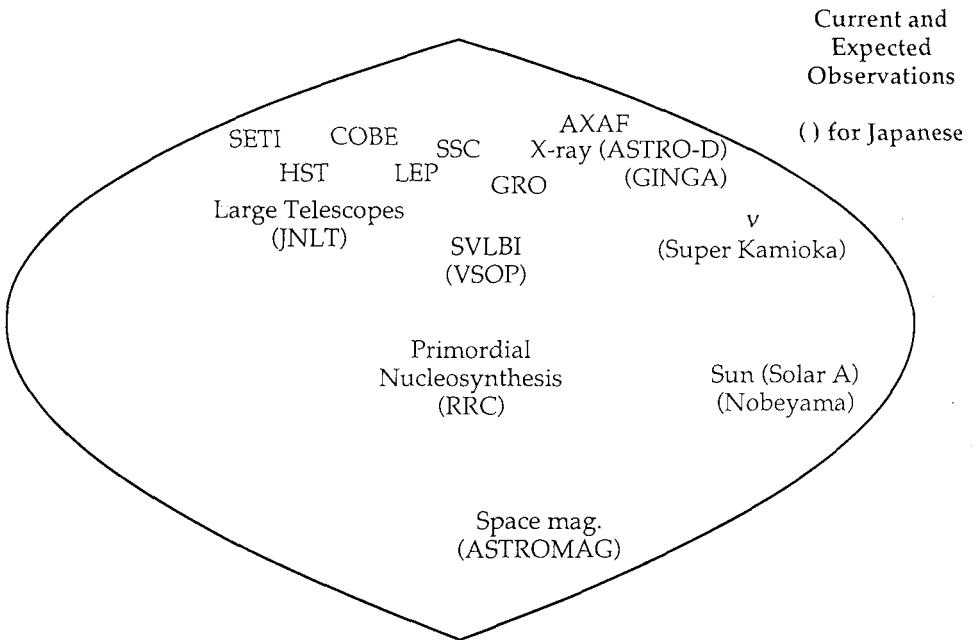


Figure 1f.