

## THE NAMING OF STARS AND THE STUDY OF PROTOSTARS

D. R. O. MORRISON  
CERN, Geneva 23, Switzerland

**ABSTRACT** The logic of naming stars could be based more on physical principles as happened in the naming of resonances in Particle Physics. A possible system might be based on extensive Monte Carlo studies of protostars followed by standard Stellar Evolutionary Model calculations.

### INTRODUCTION

This IAU Colloquium on "Inside the Stars" has been excellent and I have learnt a great deal. However as a relative outsider but with experience of a closely allied branch of Science, I hope you will allow me to make two comments that may be constructive.

### THE NAMING OF STARS

To an outsider, it is hard to find a consistent logic in the names given to stars. In Particle Physics a similar situation arose in the 1960's and early 1970's, when a large number of new particles and resonances were discovered. Names were given to them in an almost random way, using both latin and greek letters and being based on factors such as the name of the discoverer. Finally the Particle Data Group, based in LBL, Berkeley, proposed a complete and logical naming system based on the physical properties of the particles such as their baryon number, strangeness, mass, spin, parity, etc. Despite some early grumbling, this has been universally adopted and surprisingly quickly. It is now greatly appreciated and is now essential in the physical understanding of the subject. It is proposed that the stars be similarly renamed in terms of their physical properties. Ultimately this will help in the understanding of the evolution of stars.

### HOW TO CLASSIFY STARS?

Although this conferences fulfilled its aim of discussing "Inside the Stars", I was slightly surprised that there was no review talk about how stars are formed - how are the initial conditions of the Evolutionary Models reached, are they all the same or are there subsequently important differences?

Understanding stars in terms of their observational properties appears to have been moderately successful, but there seems to be a feeling that it is not sufficiently perfect to allow stars to be named in a scientific manner. In High Energy Physics, one is accustomed to groups of physicists doing vast series of

Monte Carlo calculations. This suggests another approach. While Stellar Evolutionary Models are quite successful as we have heard at this Colloquium, the description of the formation of stars is rather less successful. An understanding of this may be the real solution to the problem of how to understand and to classify stars.

It is considered that stars are formed from protostars which are large clouds of material which mainly under gravity, coalesce to give 1, or 2 or 3 or more centres. Some of these centres are sufficiently large that they give stars. The result is that about 65% of stars are in binary systems and less than 15% are single stars as our Sun. This shows that multiple star systems are normal. There clearly must be interactions between the various centres, for example our Sun probably interacted with its surroundings, absorbing material and rotating strongly, ie it was a T Tauri star in its early history. Other effects such as nearby supernova explosions, colliding galaxies etc. would also significantly influence the protostar.

It is hoped that a major project can be started to do Monte Carlo calculations of all possible types of protostars, to follow their development to stars, to study the interactions of these stars with any other star(s) in the protostar system, and then to follow their evolution up to the present. This is a major project since there are many possibilities, but it would be a very rewarding project

Later comparison with observations would yield important information. Finally it would be possible to name stars in a relatively simple way according to their basic physical properties and life-history. Then progress and understanding would be much faster.