General Discussion on the Magellanic Clouds

Abstract

A concise report on the general discussion about the Magellanic Clouds, which took place on the first conference day, is presented (composed by K.S. de Boer)

The gas arc to the East of the Magellanic Clouds, detected in the detailed Parkes H I survey (as presented by Bruens et al. 2001) and which is called the 'Leading Arm', was the starting point of the discussion. In projection on the sky it seems to emanate from the LMC, but dynamical models (Gardiner & Noguchi 1996) rather indicate it must come from the less massive of the two galaxies, the SMC. The velocities of the detected gas, in particular near the starting point near the Magellanic Complex, seem to support an SMC origin. The leading arm seems to extend to the other side of the Milky Way ('above' the disk). Gas structures have been detected there, albeit not with a continuous connection (neither spatially nor in velocity) to the gas on the Magellanic Cloud side of the Milky Way disk.

The metal content reported for the gas above the disk is half solar (Lu et al. 1998; Wakker et al. 1999), which has been used as an argument in favour of LMC origin. However, numerous other high-velocity clouds in the Milky Way halo have a metal content less than Solar. So low metallicity alone does not prove the origin of this gas is in the Magellanic Clouds.

Is it possible, de Boer asked, that a dynamically generated arm extends over more than 50^o in front of the SMC? At the LMC/SMC distance it would imply a length of well over 50 kpc from the SMC body. Gravitational interaction, was commented, can lead to very long structures indeed, but the modelling of the SMC/LMC interaction has not been pursued to great depth yet.

Does the motion of the LMC/SMC through the halo of the Milky Way lead to star formation in these dwarf galaxies? The leading edge phenomenon seems to suggest so, but then, star formation is seen everywhere in the LMC.

And were the Clouds caught into bound orbits around the Milky Way some 2 Gyr ago? After all, there seems to be a gap in the distribution of the ages of LMC star clusters between 2 and some 10 Gyr ago (see e.g. Tosi 2001). The models for orbits seem to suggest the MCs have been bound for at least 1 Gyr, but it is difficult to determine how long they have been bound really. More accurate proper motions for both LMC and SMC are required.

Is the Bar of the LMC really part of the LMC? Or could it be a galaxy in the background? Discrimination between the two possibilities, it seemed, can come from microlensing. The observed lensing is best explained by lensing from stars internally in the LMC, including those of the bar.

And then there is the question of old stars in the Bridge region. Were they torn from the LMC or from the SMC or were they formerd there?

Gallagher drew attention to the old disk of the LMC, which has a diameter of some 10^o and extends well beyond the more limited area recognized in Hα and H I maps. Furthermore, the motion of the stars is governed by the laws of gravity only, they suffer from dynamical friction, and the stars should exhibit a gaussian velocity distribution. The behaviour and motion of the gas is also subjected to gravity but in addition hydrodynamics is involved, as well as all the heating and

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cooling processes. This all must mean that the stars and the gas of the MCs do not behave in the same way.

The MC gas thus will have internal interactions as well as interactions with the gas of the halo of the Milky Way. What consequences would this have for the creation of a *gaseous* leading arm? Here the study of Gardiner (1999) shows the first step in a direction to be pursued further.

References

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