

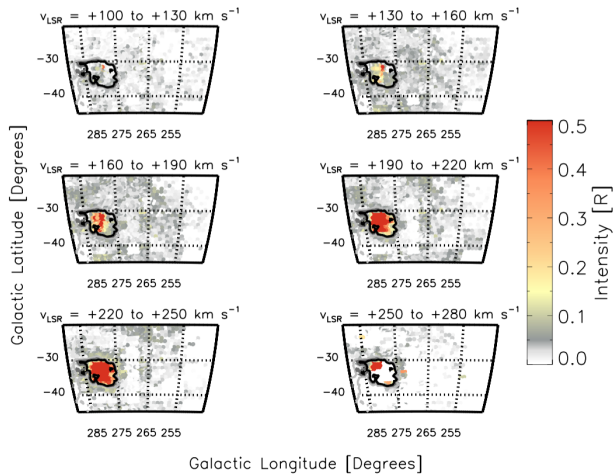
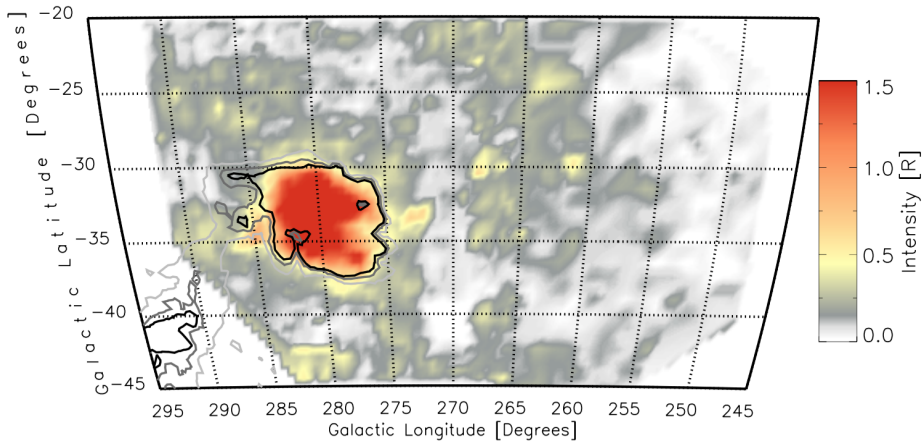
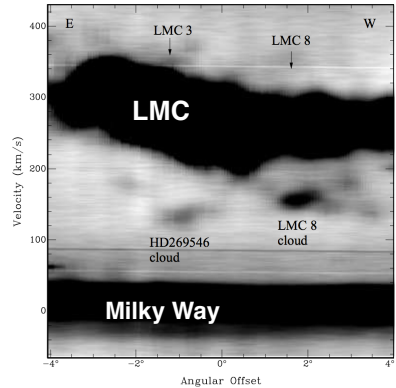
Gas Flowing out of the Large Magellanic Cloud Galaxy due to Numerous Supernovae Explosions

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Abstract: Galaxies can only grow, thrive, and continue star formation through acquiring material from their surroundings, one method for this is by stealing gas from nearby galaxies. The Large Magellanic Cloud (LMC) galaxy, in the Magellanic System, is currently losing gas due to numerous supernovae. We detected H α emission, a line at (6563 Å) that traces the ionized gas, from the material that is being ejected from this galaxy using the Wisconsin H α Mapper (WHAM) telescope. By studying the kinematics of this gas, we can see if the gas is either going to fall back into the LMC, spark star formation there, or contribute to the Milky Way Galaxy's future. The gas we are studying is moving between the velocities of +125 and +400 km/s, relative to the Sun, and is very diffuse at about 1 particle per 1000 cm³ with a temperature of roughly 10⁴ Kelvin. In a previous absorption study by Lehner et al. (2009), they were only sensitive to a portion of this gas cloud that this lies directly in front of the LMC and found the cloud has a mass of at least 10 million times the mass of our Sun. From this study, we conclude that the gas cloud appears to be much larger and extends much further away from the LMC. This means that the gas is likely much more massive than Lehner et al. (2009) predicted.

Importance: If the gas is able to escape the gravity of the Magellanic System, it will drift toward the Milky Way due to its strong gravitation pull and the gas can then spark new star formation. This is important because we need to try to understand how the Milky Way is still producing stars, when it should have run out of new gas billions of years ago. The Milky Way is supposed to completely run out of gas within the next few billion of years, so the Magellanic System is being studied as a source of replenishment. The future of the Milky Way is important to understand because it will help astronomers understand galactic systems that are much further away. Our technology is not advanced enough to be able to view other galactic systems' gas with the same quality that we can observe the Magellanic System's gas. Therefore, it is very important to understand what our neighbors are doing in order to understand systems much further away. By studying the gas coming from the LMC, we can understand how gas and galaxies affect one another.

HI Velocity Map - The velocities of the neutral gas toward the LMC. The gas clouds at +100 to +200 km/s are the larger intermediate and high velocity clouds that are associated with large scale, galactic out flows of the LMC (Steveley-Smith 2003).



Results: With these maps, we were able to show that the gas coming from the LMC covers a much larger region of the sky than originally observed by Lehner et al. (2009). This means, that the gas flowing from the LMC is most likely greater than 10 million times the mass of the Sun (Lehner et al. 2009). If the outflowing gas is able to overcome the gravitational attraction of the LMC, it will most likely be pulled toward the Milky Way. Since the mass of the gas is most likely much larger than previously thought, it could have a larger impact on the future of the Milky Way galaxy than suggested by previous studies.

LMC Final Map - This is the final map of the H α gas in front of the LMC. As you can see, there is a lot flowing out of the LMC, and the background looks quiet and doesn't have very much H α gas, this is a good thing and something we should expect.

Channel Map - showing the gas at different velocities. Each individual map has a difference of 30 km/s. The first map begins with +100 km/s, and ends with +280 km/s. The first three channel maps that span +100 to +190 km/s highlight the LMC High Velocity Clouds seen in the HI Velocity Map figure.

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