

The alignment of molecular cloud magnetic fields with spiral arms??

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Motivation: Is galactic magnetic field playing an important role in GMC formation?

Here are two examples of the competing scenarios:

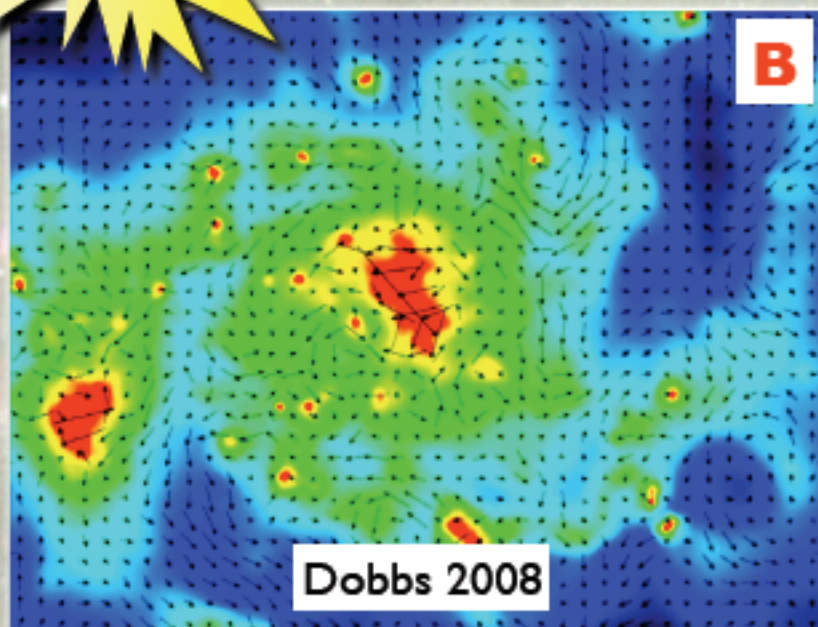
A. A patch from a global galaxy simulation. The solid vectors show the instantaneous gas velocity in the frame rotating with the spiral potential. The dotted vectors show the initial velocities (pure circular motion). The solid lines show B-field orientations. The gray scale stands for the relative surface density. The B-fields of the spiral arm are only slightly twisted in the molecular cloud complexes (dark elongated regions), and in turn the field tension is strong enough to hinder the cloud rotation.



Shetty & Ostriker 2006

OR

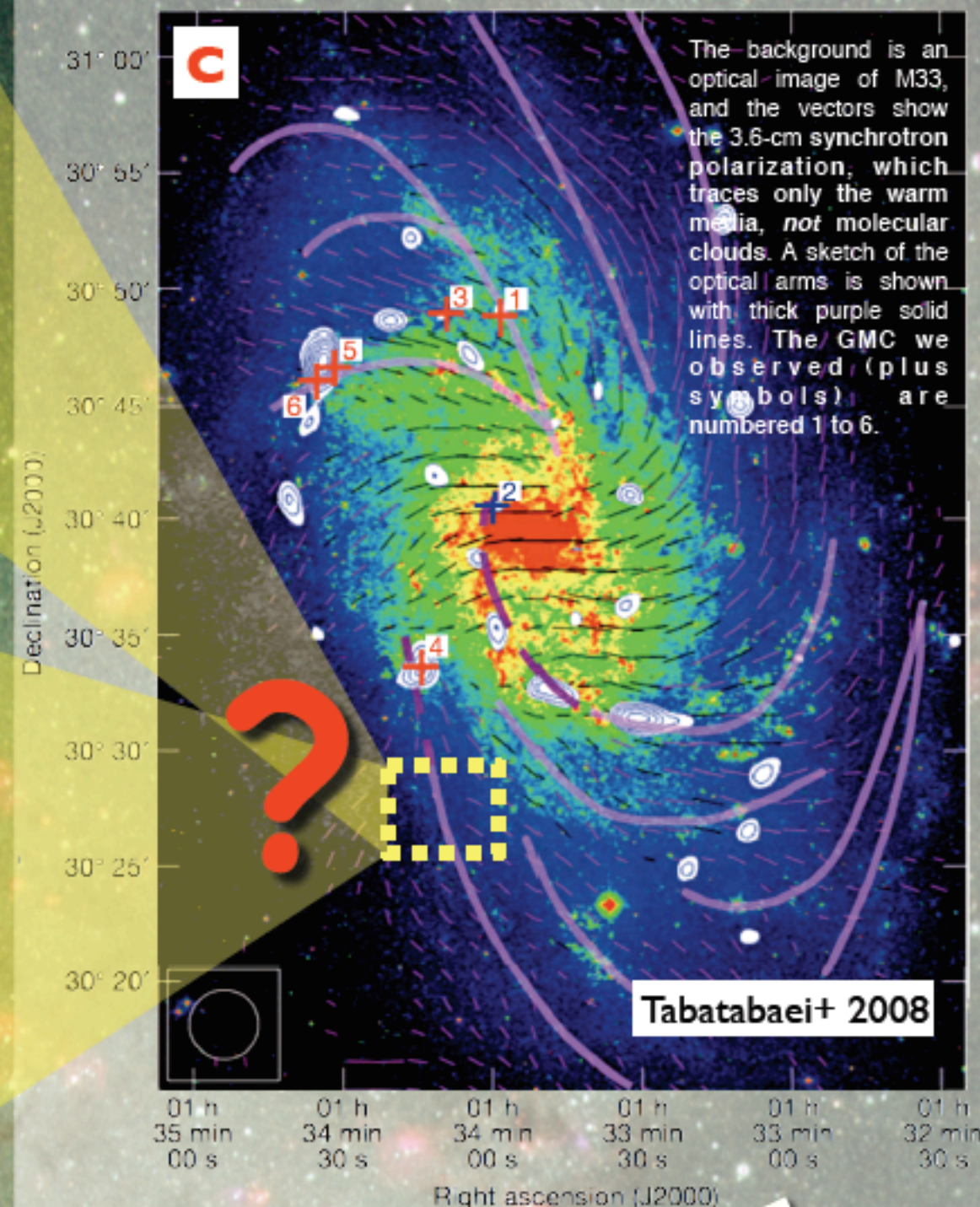
B. A similar simulation but the well developed cloud rotation has produced tidal tails extending from the GMC, and the B-fields (vectors) follow the rotation and lost the "memory" of the galactic field direction.



Dobbs 2008

Method: Observing GMC field morphologies from a face-on spiral galaxy.

The nearest one is M33, and we have observed CO (2-1) polarization from six GMCs (#1-6 in **C**) in M33.



The background is an optical image of M33, and the vectors show the 3.6-cm synchrotron polarization, which traces only the warm media, *not* molecular clouds. A sketch of the optical arms is shown with thick purple solid lines. The GMCs we observed (plus symbols) are numbered 1 to 6.

Tabatabaei+ 2008