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Letter to the Editor

Averting the magnetic braking catastrophe on small scales: disk formation due to Ohmic dissipation *Corrigendum*

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Key words. magnetohydrodynamics – protoplanetary disks – stars: formation – stars: magnetic field – errata, addenda

As a result of a sign error in a derivation, the minus sign in front of the second term in in Eq. (1) should be a plus sign. However, the first term, which has the correct sign, usually dominates the second term.

Hence, our main qualitative result remains unchanged, namely that we do achieve disk formation due to Ohmic dissipation. However, the quantitative result of the increase of the central mass-to-flux ratio by a factor 500 needs to be updated. It is now a factor of 100. The corrected figure and updated text are printed below.

2. Method

[...] We modify the ideal-MHD induction equation to include Ohmic dissipation:

$$\frac{\partial B_{z,\mathrm{eq}}}{\partial t} + \frac{1}{r}\frac{\partial}{\partial r}\left(rB_{z,\mathrm{eq}}v_{\mathrm{r}}\right) = \frac{\eta}{r}\frac{\partial}{\partial r}\left(r\frac{\partial B_{z,\mathrm{eq}}}{\partial r}\right) + \frac{\partial \eta}{\partial r}\frac{\partial B_{z,\mathrm{eq}}}{\partial r}. \quad (1)$$

Here, $B_{z,\mathrm{eq}}$ denotes the z-component of the magnetic field at the midplane of the disk, and v_{r} is the radial component of the neutral velocity.

4. Results

4.1. Prestellar phase and formation of the second core

[...] Because of magnetic flux dissipation, the mass-to-flux ratio increases by two orders of magnitude in the first core region for $\widetilde{\eta}_0 = 1$, but by a factor of 15 even for $\widetilde{\eta}_0$ as low as 0.01 (Fig. 1, middle panel). [...]

5. Discussion and conclusions

[...] This is achieved by non-ideal MHD effects reducing the field strength by $\approx 10^2$ compared to a flux-freezing model. [...]

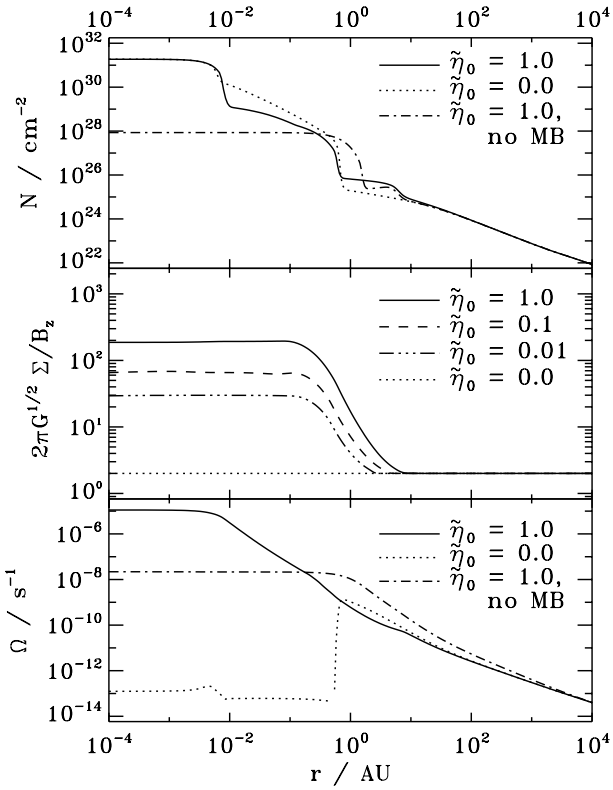

Fig. 1. Spatial profiles of various quantities after the second collapse (after $\approx 4.8 \times 10^4$ yr). [...] *Middle*: the mass-to-flux ratio is increased by (even weak) Ohmic dissipation by a factor between 15 and 100. The influence is significant even well outside the boundary of the first core (at a few AU). [...]