

Abstract Submitted
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Superbubble Explosions and the Galactic Dynamo¹ RUSSELL KULSRUD, Princeton Plasma Physics Laboratory — The alpha-omega dynamo appears to be the most likely origin for the galactic magnetic field. However, it has a major problem in that to complete the dynamo operation, flux of the wrong sign must be expelled. For normal situations this is no problem. However, in the case of the galactic disc, the combination of almost perfect flux freezing and a strong gravitational field strongly inhibit this expulsion. It is energetically impossible to expel straight magnetic lines from the disc because they would carry all their ISM with them and their gravitational binding energy is much too large. I propose that the lines can be expelled in a topological manner. This can be done by massive superbubble explosions that can expel a tiny piece of each line leading to a situation where the lines in the disc are broken and act like lines of finite length. Such lines can be random turned in the disc and cause the disappearance of any negative flux. If this proposal should be valid then the alpha-omega dynamo can work to amplify the a very weak field to the present galactic value.

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