

Investigation of Spatial Magnetic Field Lines

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Objective:

To conduct an experiment on the Space Station to study magnetic field lines in a microgravity environment.

Experiment on Earth:

Place a bar magnet under a sheet of paper.

Sprinkle iron filings on top.

Filings align with magnetic field lines, forming visible patterns.

Challenges in Microgravity:

No gravity to pull iron filings down.

Visualization Difficulties

Complex Field Structures

Microgravity Experiment Setup:

Use a clear box filled with iron filings.

Place a bar magnet inside the box and fix it to the base.

Rotate the box slowly to let iron filings distribute around the magnet.

Hypothesis

Unlike on the Earth, the iron tips in a microgravity environment such as a space station would be suspended and distribute themselves randomly around the magnet in three dimensions. Additionally, the presence of external factors such as magnetic fields from celestial bodies and plasma interactions can lead to more complex and dynamic shapes of the magnetic field lines, including distortions, loops, and intertwined lines.

Results in Space, Discussion, and Consideration: Differences from the Hypothesis

Results in Space

- Iron filings did float freely around the magnet.
- Filings formed a clear three-dimensional pattern.
- The shape of the magnetic field lines remained static throughout the experiment.

Hypothesis Confirmation

- The iron filings behaved as expected, floating in a three-dimensional pattern around the magnet.

Unexpected Observations:

- The magnetic field lines' shape did not exhibit dynamic changes.
- External factors had no observable impact on the field lines' structure.

Utilization of the Characteristics in Microgravity

1. Microgravity Advantage:

In microgravity, the absence of gravity allows iron filings to move freely in all directions.

Enables observation of the magnetic field in a true three-dimensional context.

Iron filings contained in a clear, enclosed box to prevent drifting, ensuring they stay within the observable area around the magnet.

2. Enhanced Visualization:

Lack of gravitational pull allows filings to float and align freely.

Enables observation of the spatial distribution and structure of the magnetic field lines.

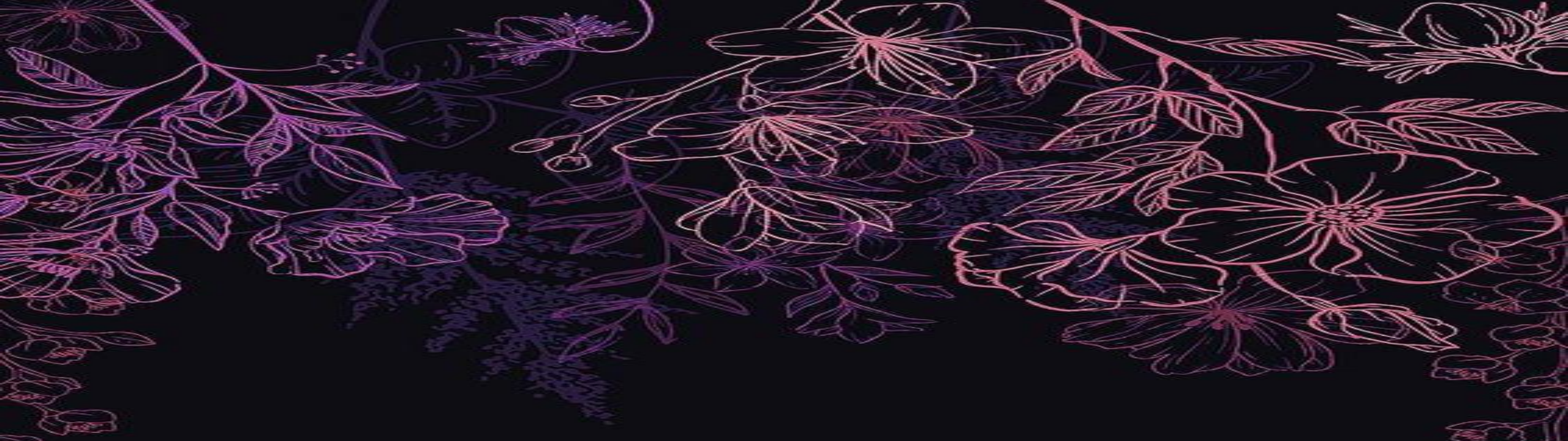
Provides a full three-dimensional visualization of the magnetic field lines.

3. Insights and Future Directions:

Static nature of magnetic field lines suggests weaker or less influential external magnetic fields and plasma interactions on ISS.

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Thank You!!!!