

# **Voyager 1 and 2 Data Show Entry of Interstellar Particles into the Solar System**

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**The Magnetometer instrument on board the Voyagers measures the magnetic fields of solar origin in the heliosphere, defined as that region of space in which the principal constituents and dynamics are controlled by our Sun. The solar magnetic fields are carried into interplanetary space by the supersonic and super-Alfvenic expansion of the solar atmosphere, known as the Solar Wind.**

**Voyagers are currently measuring the weakest interplanetary magnetic fields ever detected, typically much less than 0.1 nT (nanoTesla). For comparison, the Earth's magnetic field at the equator is 30,000 nT so we are now measuring fields that are less than 3 millionths of the Earth's field. The field is very weak because the heliosphere is so big that the magnetic field must decrease in intensity according to fundamental laws of physics. The 2 Voyager spacecraft are at distances 55-65 times larger than the Earth is from the sun. It takes their radio signals more than 8 hours to reach Earth, traveling at the speed of light!**

# Detection of Pressure Balance Structures

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**A most significant new result has been the indirect detection of the local interstellar medium through which our entire solar system is moving. The magnetometer has discovered Pressure Balanced Structures in the highly correlated time variations of the magnetic fields and solar wind.**

**These special plasma structures are an indirect but very important confirmation of the entry of interstellar neutral atoms into the heliosphere. They cannot be directly detected by any of the other instruments onboard the Voyager spacecraft. The interstellar atoms become ionized by their interactions with the solar wind protons and contribute to the total plasma pressure, which the magnetometer can determine accurately.**

**The difference between the directly measured solar wind plasma pressure and the inferred total plasma pressure, as determined by the magnetic field, permits a calculation of the number and characteristics of these interstellar particles. This discovery of the Pressure Balanced Structures is the most recent important result**

# **The Voyager Magnetic Field Experiment**

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**The instrument requires only 2.3 watts for full operation and weighs only 5.6 KG. The sensors are located at the end of a 13 meter long boom to reduce the contaminating and polluting effects of spacecraft generated magnetic fields.**

**The Principal Investigator for the Magnetic field instrument is:**

**Dr. Norman F. Ness  
President and Professor  
Bartol Research Institute (UD-BRI)  
University of Delaware  
Newark DE 19716**

**Internet: [nfness@bartol.udel.edu](mailto:nfness@bartol.udel.edu)  
NSI: BARTOL::NFNESS (6270)  
Tel: 302-831-8116  
Fax: 302-831-1843**

**The magnetometer team includes scientists at the UD-BRI, Drs. Charles Smith and Gary Zank, and Dr. Leonard Burlaga of the NASA-Goddard Space flight Center in Greenbelt, MD. where the instrument was built in the early 1970's.**