EP 16 Astrophysik: Die Pioneer-Anomalie

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The Pioneer Anomaly - Recent Results of Analysis — •Hansjörg Dittus[1], Claus Lämmerzahl[1], and Slava Turyshev[2] — [1]ZARM, University of Bremen, Germany — [2]JPL, Pasadena CA, USA

Subsequent analysis of the radio-metric tracking data from the Pioneer 10 and 11 spacecraft (launched in 1972 and 1973) at distances between 20 and 70 AU from the Sun has consistently indicated the presence of an anomalous constant Doppler frequency drift. The drift can be interpreted as being due to a constant acceleration of $a_{P}=(8.74 \pm1.33) \cdot 10^{-10} m / s^{2}$ directed towards the Sun. By 1980, Pioneer 10 had passed a distance of ca. 20 AU from the Sun and the acceleration caused by solar radiation pressure on the spacecraft had decreased to less than $ 4 \dot 10^{-10} m / s^{2}$ when the anomaly in the Doppler signal became evident. After Jupiter and (for Pioneer 11) Saturn encounters, both spacecraft followed escape hyperbolic orbits near the plane of the ecliptic to opposide sides of the solar system. Although the most obvious explanation would be that there is a systematic origin to the effect, e.g. heat or propulsion caused by gas leaks etc., no unambigous, onboard systematic has been discovered during an excessive data analysis of data recorded between 1988 and 1998. This inability to explain the anomalous acceleration of the Pioneer spacecraft with standard physics has caused a growing discussion about its origin. We like to discuss the recent results from new analytical work and report up-coming activities for new consistency tests.