S. Jocelyn Bell Burnell

1967, Cambridge

Nature 217, 709-713 (24 February 1968)

Observation of a Rapidly Pulsating Radio Source

A. HEWISH, S. J. BELL, J. D. H. PILKINGTON, P. F. SCOTT & R. A. COLLINS

1. Mullard Radio Astronomy Observatory, Cavendish Laboratory, University of Cambridge

Abstract

Unusual signals from pulsating radio sources have been recorded at the Mullard Radio Astronomy Observatory. The radiation seems to come from local objects within the galaxy, and may be associated with oscillations of white dwarf or neutron stars.

Honors

- **Michelson Medal, Franklin Institute, Philadelphia 1973**
- **J. Robert Oppenheimer Memorial Prize, Center for Theoretical Studies, Miami 1978**
- **Beatrice M. Tinsley Prize, American Astronomical Society 1987**
- **Herschel Medal, Royal Astronomical Society, London 1989**
- **Fellow, Institute of Physics**
- **Jansky Award, National Radio Astronomy Observatory 1995**
- **Commander of the British Empire (CBE) *for her services to astronomy* 1999**

Honorary D.Univ., York University 1994
Honorary D.Sc. from: Heriot-Watt University 1993,University of Warwick 1995, University of Newcastle 1995, and Cambridge University 1996.

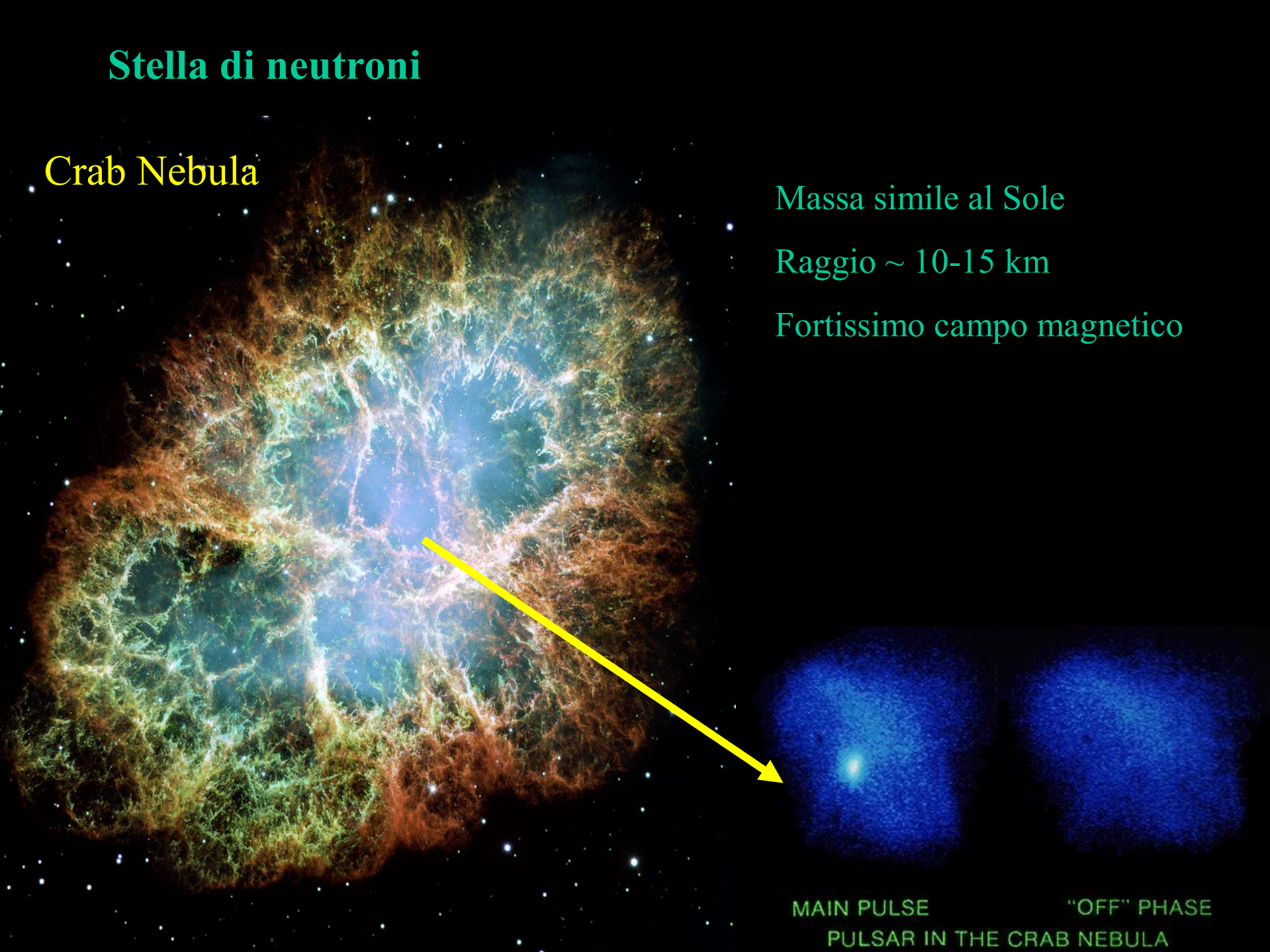
Stella di neutroni

Crab Nebula

Massa simile al Sole

Raggio ~ 10-15 km

Fortissimo campo magnetico



Nature **426**, 531-533 (4 December 2003)

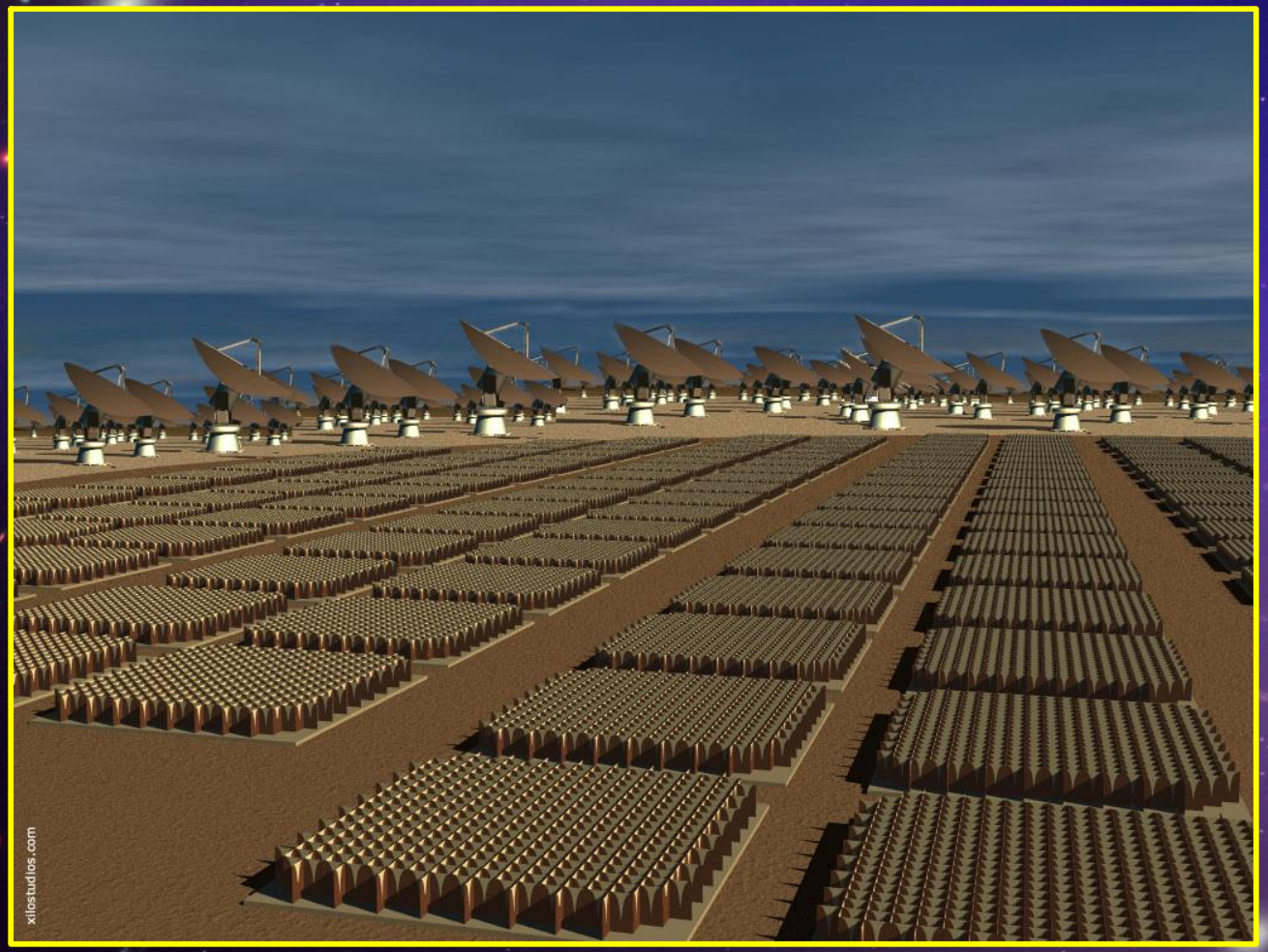
An increased estimate of the merger rate of double neutron stars from observations of a highly relativistic system

M. Burgay[1], N. D'Amico[2,3], A. Possenti[3,4], R. N. Manchester[5], A. G. Lyne[6], B.C. Joshi[6,7], M. A. McLaughlin[6], M. Kramer[6], J. M. Sarkissian[5], F. Camilo[8], V. Kalogera[9], C. Kim[9] and D. R. Lorimer[6]

Università degli Studi di Bologna, Dipartimento di Astronomia, via Ranzani 1, 40127, Bologna, Italy

The merger of close binary systems containing **two neutron stars should produce a burst of gravitational waves**, as predicted by the theory of general relativity. ……Here we report the discovery of a 22-ms pulsar, PSR J0737–3039, which is a member of a highly relativistic double-neutron-star binary with an orbital period **of 2.4 hours**. This system will merge in about 85 Myr, a time much shorter than for any other known neutron-star binary.

Square Kilometer Array



~10000 – 20000 pulsars nella nostra Galassia

THE DISCOVERY OF THE BINARY PULSAR

Nobel Lecture, December 8, 1993

by RUSSELL A. HULSE

Princeton University, Plasma Physics Laboratory, Princeton, NJ 08543, USA

PULSARS

Pulsars were first discovered in 1967 by Antony Hewish and Jocelyn Bell at Cambridge University, work for which a Nobel Prize was awarded in 1974.

At the time, they were engaged in a study of the rapid fluctuations of signals from astrophysical radio sources known as scintillations. They were certainly not expecting to discover an entirely new class of astrophysical objects, just as we were certainly not expecting to discover an astrophysical laboratory for testing general relativity when we started our pulsar search at Arecibo several years later. Pulsars have indeed proven to be remarkable objects, not the least for having yielded two exciting scientific stories which began with serendipity and ended with a Nobel Prize.

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Research Articles

Tests of General Relativity from Timing the Double Pulsar

M. Kramer, I. H. Stairs, R. N. Manchester, M. A. McLaughlin, A. G. Lyne, R. D. Ferdman, M. Burgay, D. R. Lorimer, A. Possenti, N. D'Amico, J. M. Sarkissian, G. B. Hobbs, J. E. Reynolds, P. C. C. Freire, F. Camilo

The double pulsar system PSR J0737-3039A/B is unique in that both neutron stars are detectable as radio pulsars. They are also known to have much higher mean orbital velocities and accelerations than those of other binary pulsars. The system is therefore a good candidate for testing Einstein's theory of general relativity and alternative theories of gravity in the strong-field regime. We report on precision timing observations taken over the 2.5 years since its discovery and present four independent strong-field tests of general relativity. These tests use the theory-independent mass ratio of the two stars. By measuring relativistic corrections to the Keplerian description of the orbital motion, we find that the "post-Keplerian" parameter *s* agrees with the **value predicted by general relativity within an uncertainty of 0.05%, the most precise test yet obtained**