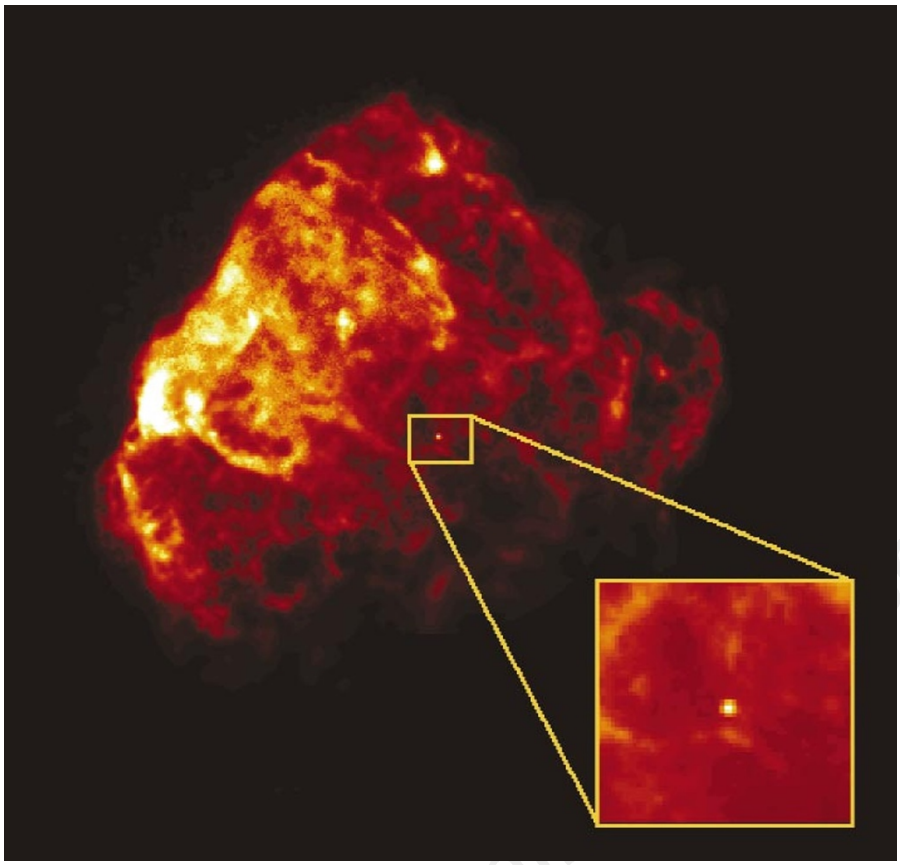

S. SNOWDEN/C. BECKER/R. PETRE/F. WINKLER

Figure 1 **The 3,700-year-old supernova remnant Puppis A, imaged in X-rays by the satellite Rosat. The bright spot has been interpreted as its neutron star, even though no pulsations are seen, because it has a large ratio of X-ray to optical emission. Its inferred transverse speed is ~1,000 km s^{-1}. Interestingly, the spot is on the opposite side to the fast, oxygen-rich knots, as one might expect in some models of neutron-star recoil during a supernova explosion.**

the surface of the forming neutron star) and the explosion, there is a delay while the outward-moving shock wave travels through the star. During this 100 to 1,000 milliseconds, the core is strongly convective, boiling and churning at sonic speeds (~3×10^4 km s^{-1}). Any slight asymmetry in collapse can amplify this jostling, and result in vigorous kicks and torques to the residue that can be either systematic or random[11].

Whatever the details, it would seem odd if the nascent neutron star were not left with a net recoil and spin, although it is not known whether pulsar speeds as high as 1,500 km s^{-1} can be reached through this mechanism. But asymmetries in the matter distribution may also cause asymmetries in the emission of neutrinos, which carry away most of the binding energy of the neutron star (around 3×10^{53} ergs). Amazingly, a net angular asymmetry in the neutrino radiation of only 1% would give the residue a recoil of 300 km s^{-1}. Not surprisingly, many theorists have concentrated on producing such a neutrino asymmetry, invoking anisotropic accretion, exotic neutrino-flavour physics, or the influence of strong magnetic fields on neutrino cross-sections and transport. The last is particularly interesting, but generally requires[12] magnetic fields of 10^{14} to 10^{16} gauss, far larger than the average pulsar surface field of 10^{12} gauss. Perhaps the pre-explosion convective motions themselves can generate the required fields by dynamo action.

It is now reasonable to imagine a theory that unifies the spins and velocities of neutron stars, the anisotropies observed in supernova ejecta, and stellar collapse and explosion. To date, dialogue between the pulsar and the supernova communities has been rare — but the paper by Spruit and Phinney is a good conversational gambit. □

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Daedalus

Deceptive appearances

Few women have ever been satisfied with their figures. Hence the foundation-garment industry. Perhaps its peak was the late nineteenth century, when the fashionable Victorian young lady seems to have carried nearly as much rigging as a sailing ship.

Since then, elasticated undergarments have grown simpler and less fashionable. Modern women are urged to perfect their figures by diet and exercise. This state of affairs is not an improvement — elastic at least worked. So Daedalus is studying the basics of the technology.

Tensioned clothing cannot truly shape; it can only squeeze. The natural resulting cross-sections are circles or arcs of circles. The human figure, however, tends to have elliptical or ovoid cross-sections. To impose such shapes, a garment needs not tightness, but directional rigidity.

So DREADCO corsetières are devising fabrics woven, not of fibres which can only carry tension, but of micro-girders which can resist bending. These tiny I-beams have polyimide compression faces, carbon fibre tension faces, and thermoplastic central webs. As with some steel girders, they are initially made in T-section, with a sawtooth vertical web. When two such sections are welded together by their tooth points, the resulting I-beam has diamond-shaped holes along its web. The warp and weft half-girders of the new fabric are laid on a shaped former, the corresponding top half-girders are brought down on them, and all the welds are made at once by a fast-set adhesive. Warp and weft micro-girders thus pass through each other's web holes. They can move angularly against each other, giving the new fabric the soft 'drape' of cloth. But it has a definite shape derived from its former; and will impose that shape, subtly but firmly, on the wearer.

Until the complex micro-engineering of production has been optimized, DREADCO's 'Shapers' will be vastly expensive. In the fashion trade, fortunately, this is not necessarily a disadvantage, especially for such a revolutionary product. Instead of merely squeezing the wearer at one point and displacing the tissue elsewhere, they will truly shape her figure. Thin and seemingly insubstantial, they will flatten an excessive stomach without cramping the rest of the waist, and will form thighs, buttocks and breasts into pert, becoming contours without even feeling tight. Even if quite overweight, the happy wearer will still display a perfect figure, but slightly scaled up.

David Jones