

The background is a deep blue gradient with a subtle pattern of white stars. Overlaid on the left side are several white circular and semi-circular lines, some with arrows indicating a clockwise direction. A prominent circular scale with degree markings from 140 to 260 is visible, with the numbers increasing in a clockwise direction. The text 'NEUTRON STARS' is positioned on the right side of the image.

NEUTRON STARS

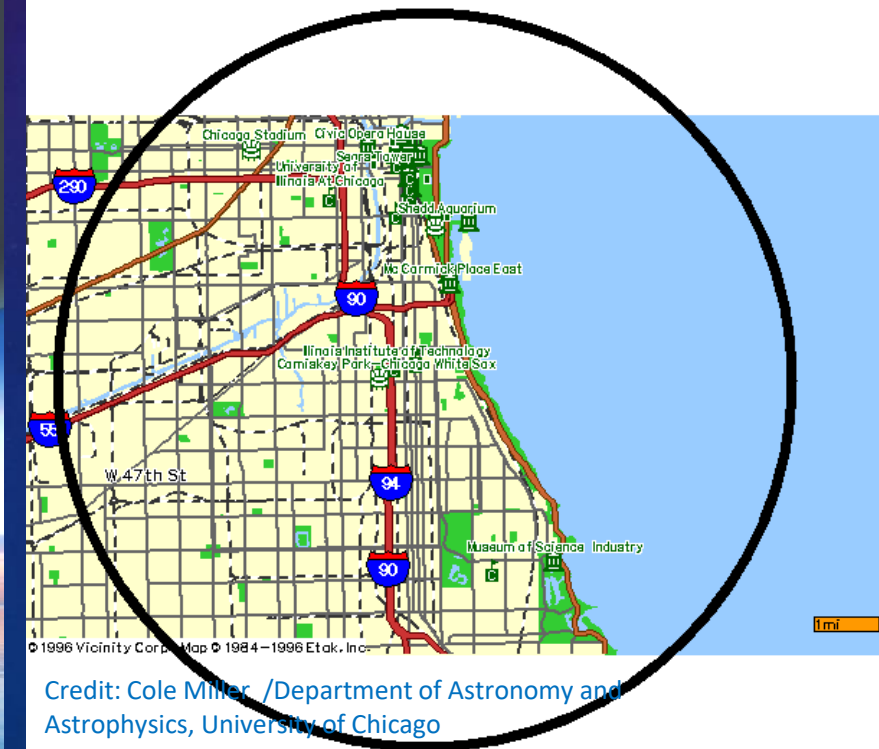
Size: 20 km

Mass: 2.77×10^{30} kg or $1.4 M_{\odot}$

Density: 3.7×10^{17} to 5.9×10^{17} kg/m³



Neutron star vs. Chicago

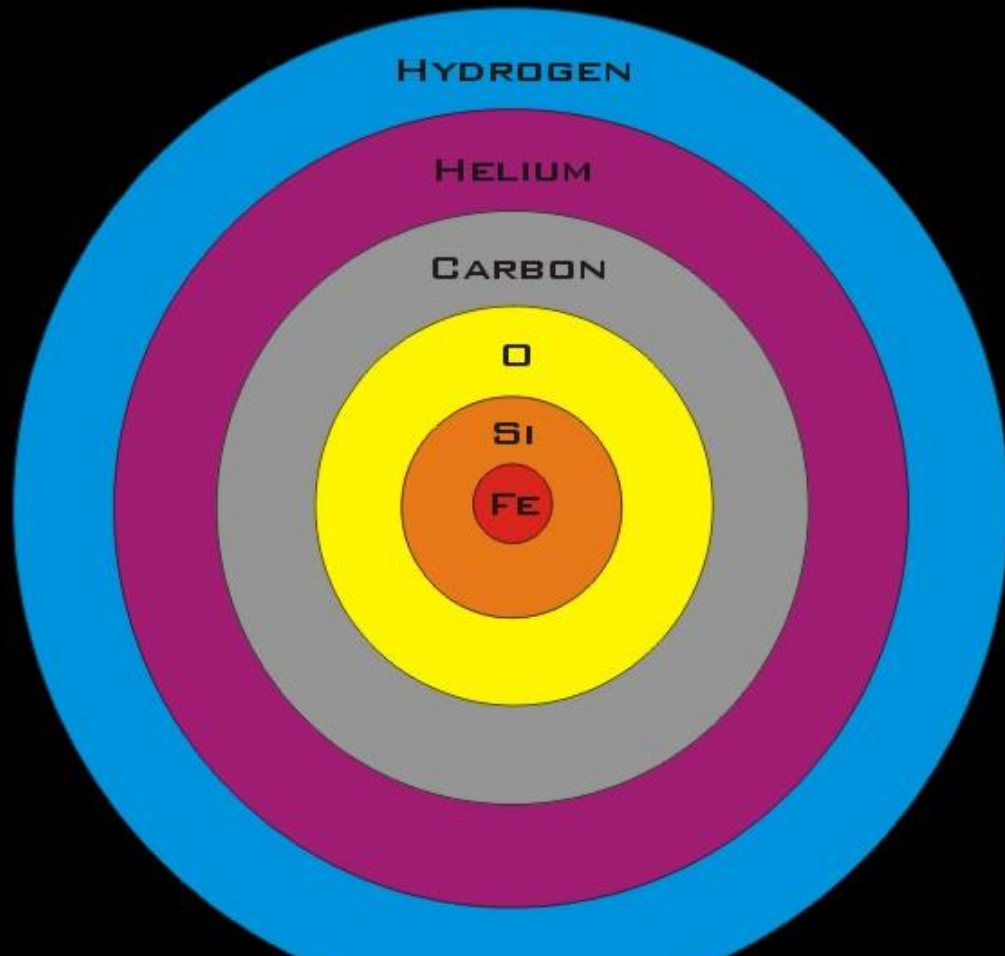


Credit: Cole Miller / Department of Astronomy and Astrophysics, University of Chicago

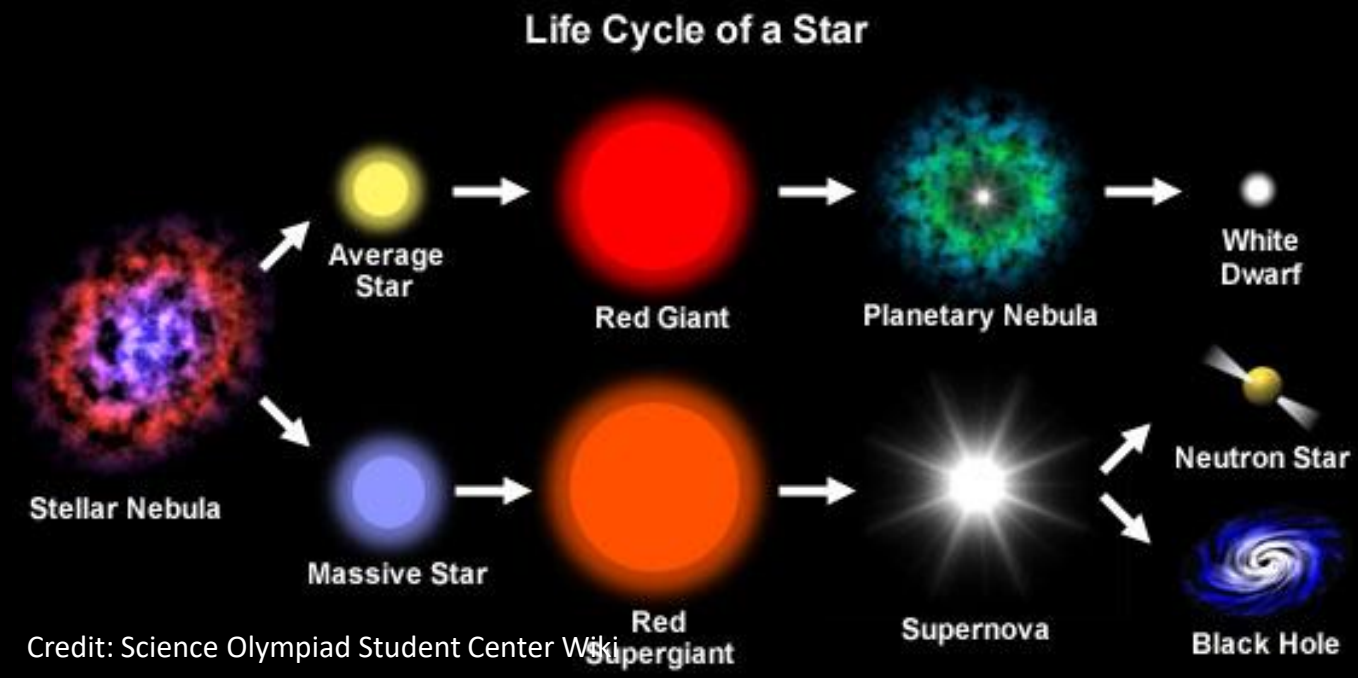


Credit: Nick Gertonson / Daniel Schwen / Northwestern / LIGO-Virgo

Stellar Evolution



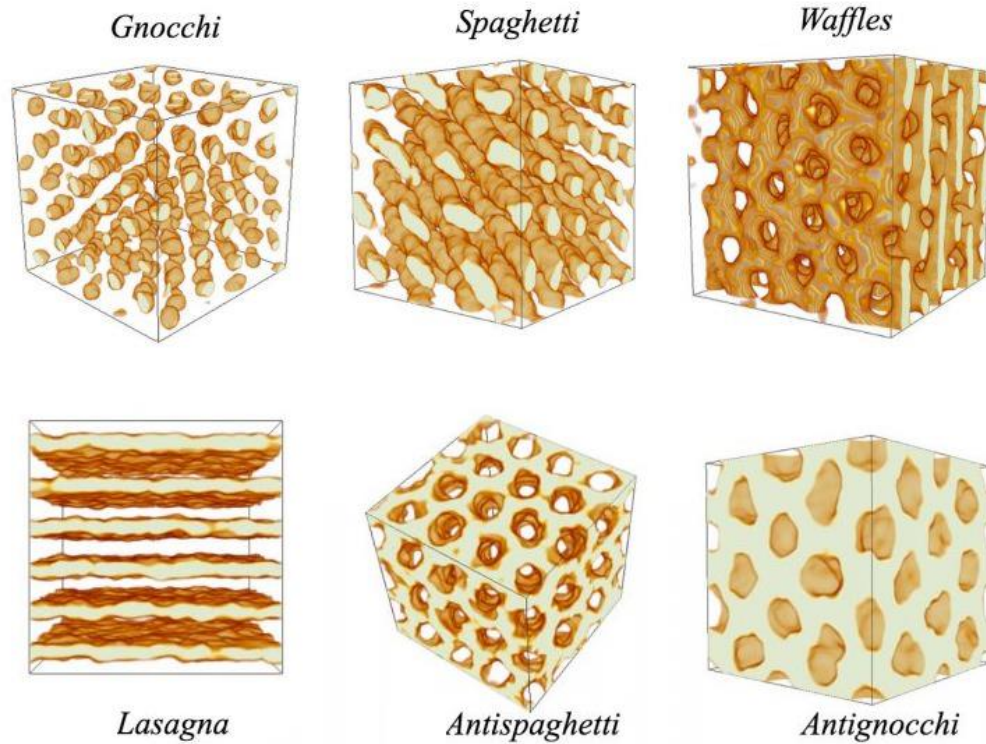
Credit: Carolyn Brinkworth and Claire Thomas / University of Leicester



Credit: Science Olympiad Student Center Wiki

Structure

Pasta... Nuclear Pasta.



Credit: M. E. Caplan, C. J. Horowitz / Indiana University

INSIDE A NEUTRON STAR

A NASA mission will use X-ray spectroscopy to gather clues about the interior of neutron stars — the Universe's densest forms of matter.

Outer crust

Atomic nuclei, free electrons

Inner crust

Heavier atomic nuclei, free neutrons and electrons

Outer core

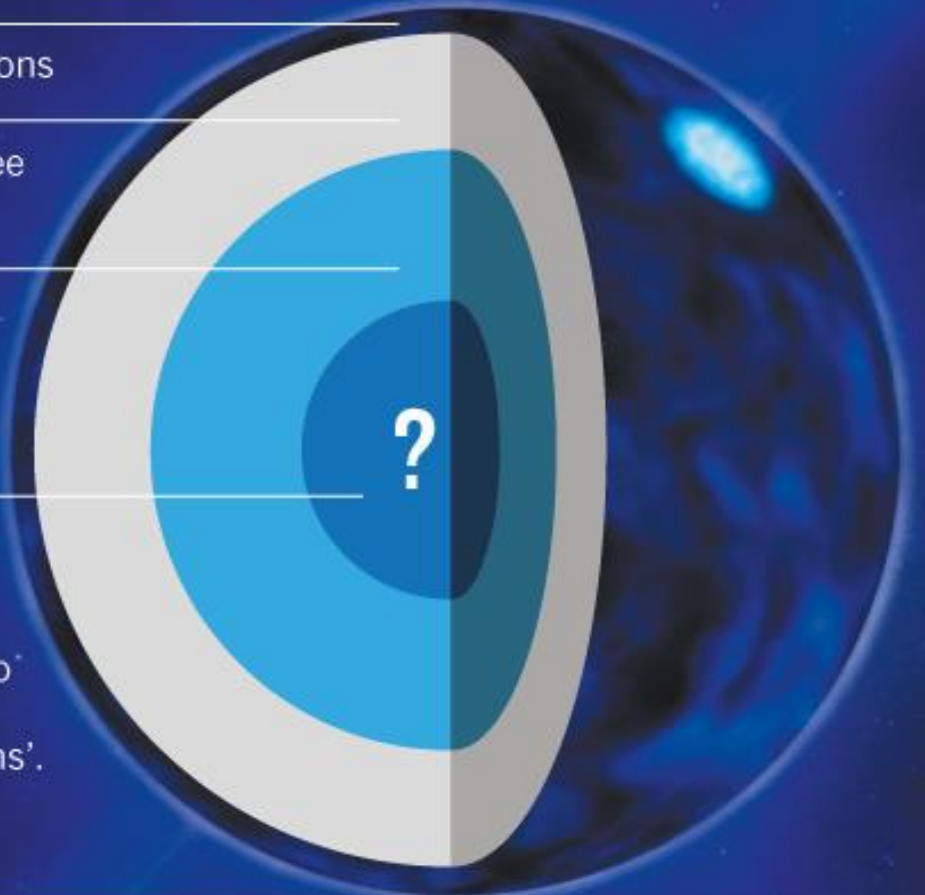
Quantum liquid where neutrons, protons and electrons exist in a soup

Inner core

Unknown ultra-dense matter. Neutrons and protons may remain as particles, break down into their constituent quarks, or even become 'hyperons'.

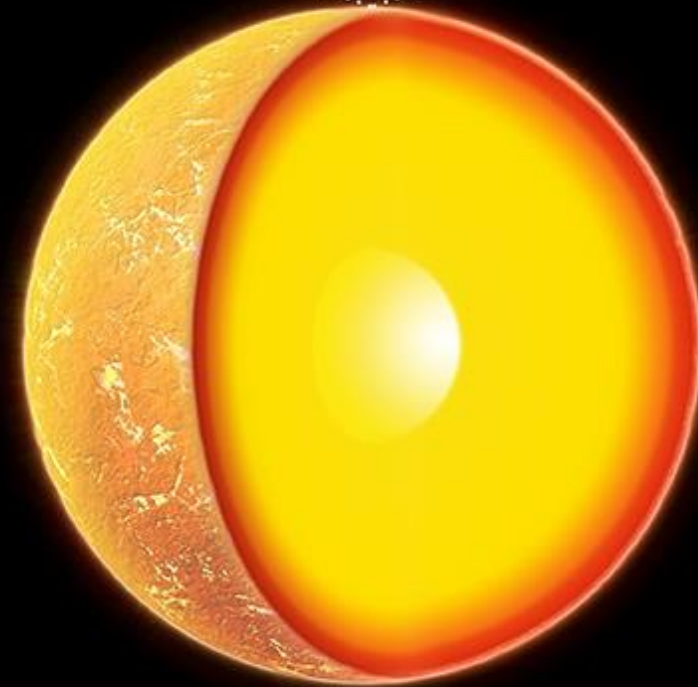
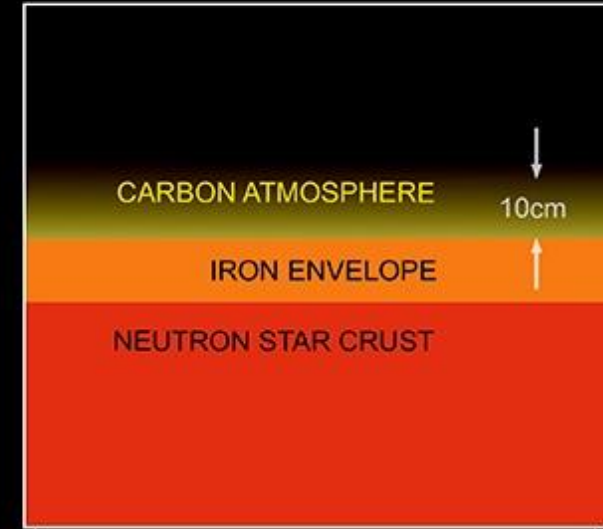
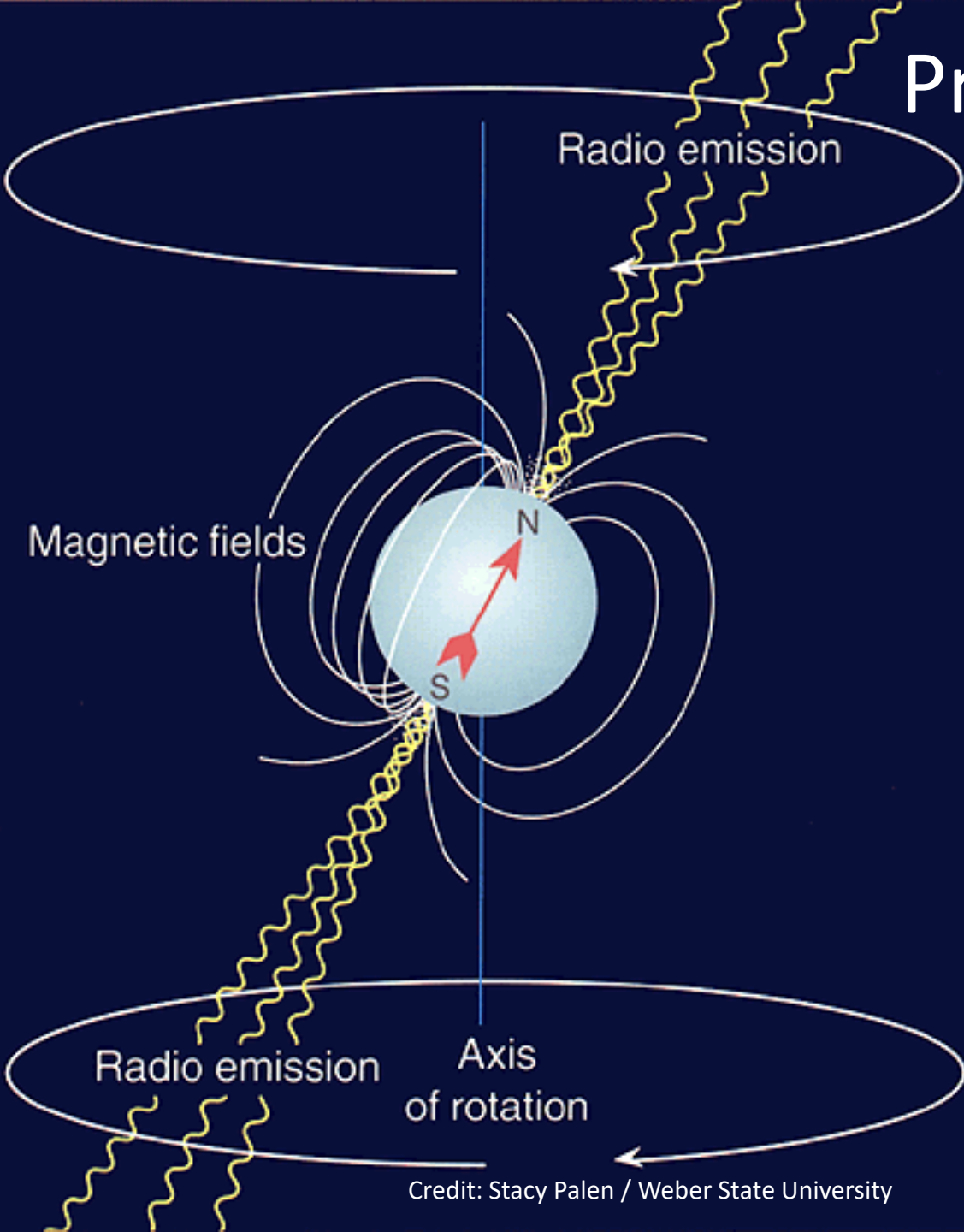
Atmosphere

Hydrogen, helium, carbon









Beam of X-rays coming from the neutron star's poles, which sweeps around as the star rotates.

Properties

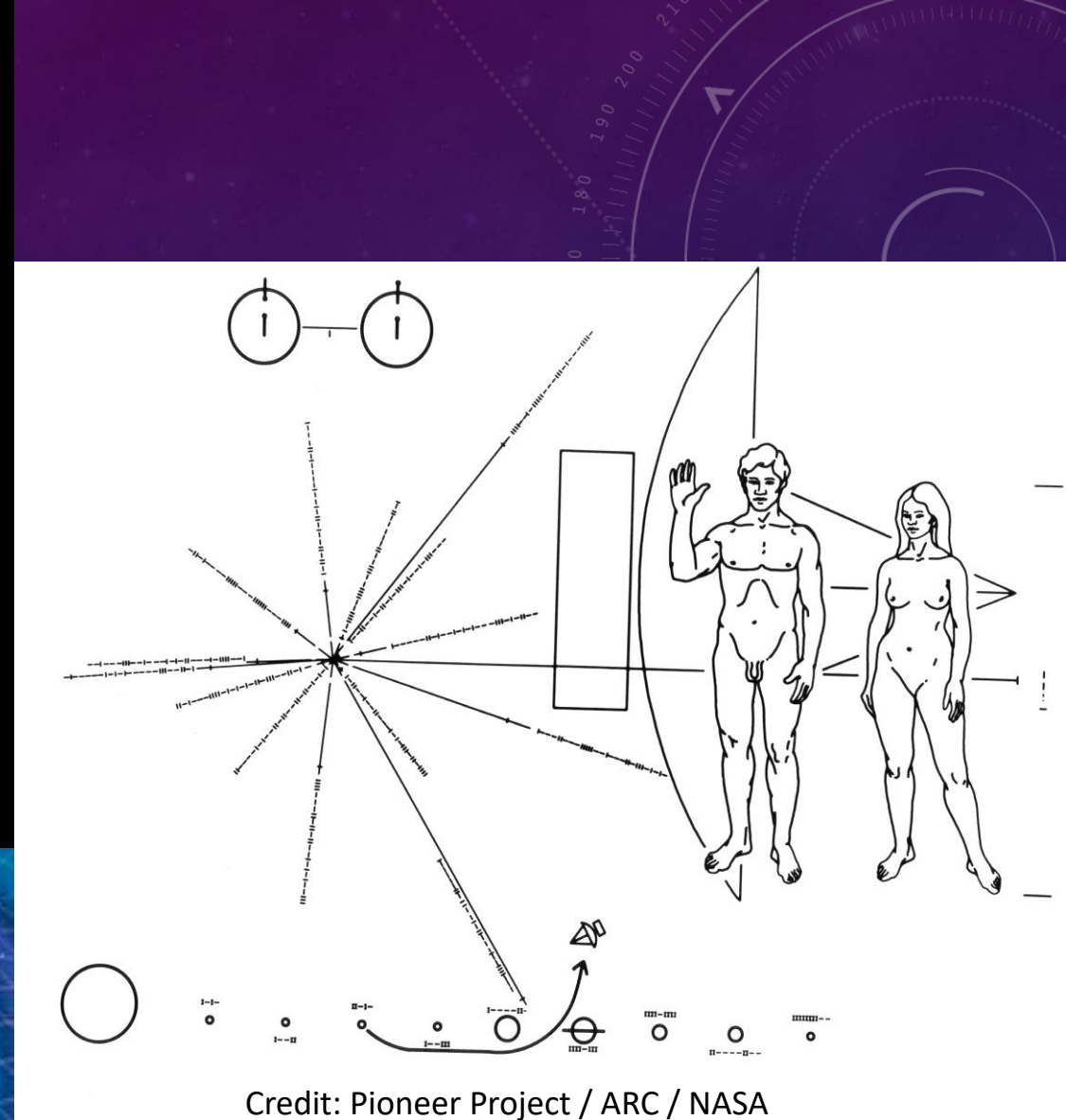


Credit: Stacy Palen / Weber State University

The Origin of the Solar System Elements

1 H	big bang fusion 						cosmic ray fission 												2 He
3 Li	4 Be	merging neutron stars 						exploding massive stars 						5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg	dying low mass stars 						exploding white dwarfs 						13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr		
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe		
55 Cs	56 Ba			72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn	
87 Fr	88 Ra																		
		57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu			
		89 Ac	90 Th	91 Pa	92 U														
Credit: Jennifer A. Johnson/The Ohio State University; NASA; ESA																			

Credit: Jennifer A. Johnson/The Ohio State University; NASA; ESA



Credit: Pioneer Project / ARC / NASA

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“WHAT WOULD A
TEASPOONFUL
OF NEUTRON
STAR DO TO
YOU?”



<https://io9.gizmodo.com/5805244/what-would-a-teaspoonful-of-neutron-star-do-to-you>