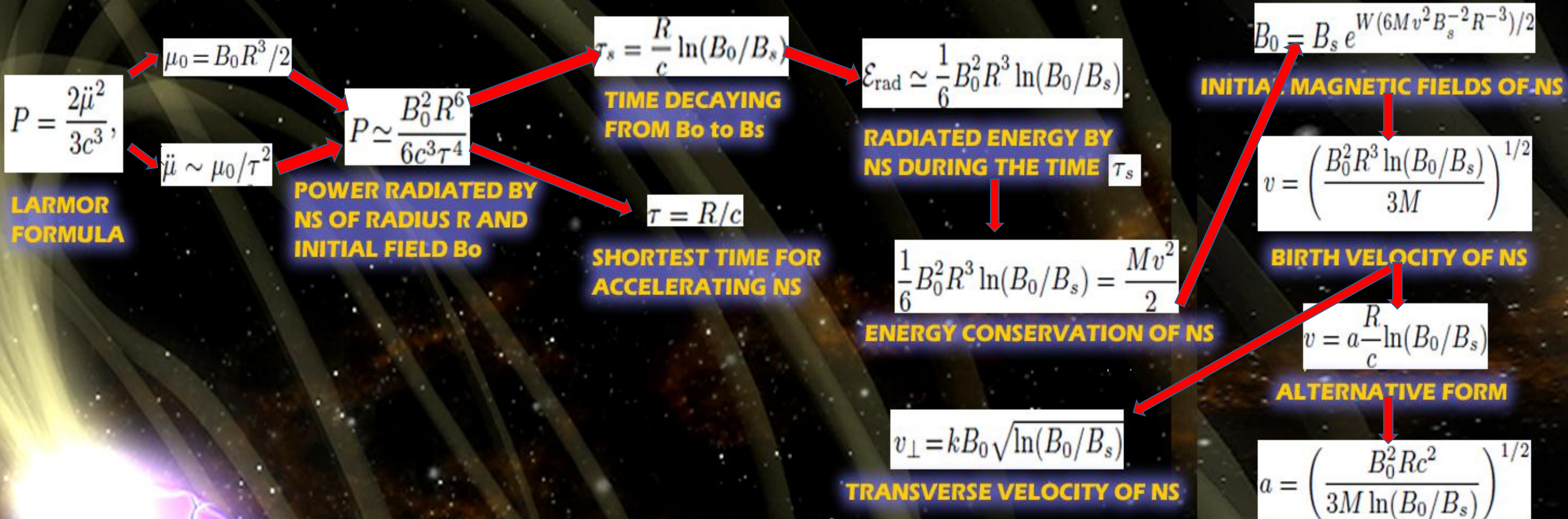


Ricardo Heras

SEIEM, Preparatoria abierta en Toluca Edo. de Mex.

*This work suggests the idea that all neutron stars experienced at birth an ultrafast decay of their magnetic fields from their initial values to their current surface values. If the electromagnetic energy radiated in this decay is converted into kinetic energy then this conversion of energy predicts that radio pulsars are born with magnetic fields typical of magnetars.*



MAGNETAR	PULSAR	MILLISECOND PULSAR
$B_0 \approx 1.75 \times 10^{15} \text{G}$	$B_0 \approx 6.29 \times 10^{14} \text{G}$	$B_0 \approx 2.57 \times 10^{14} \text{G}$
J1809-1943	PSR J2144-3933	
$B_s = 2.10 \times 10^{14} \text{G}$	$B_s = 1.9 \times 10^{12} \text{G}$	$B_s = 2.59 \times 10^8 \text{G}$
$v_{\perp} = 227 \text{ km/s}$	$v_{\perp} = 135 \text{ km/s}$	$v_{\perp} = 85 \text{ km/s}$

**ENERGY CONSERVATION INCLUDING ROTATIONAL ENERGY**

$$\frac{1}{6} B_0'^2 R^3 \ln(B_0'/B_s) = \frac{Mv^2}{2} - \frac{4\pi^2 M R^2}{5} \left( \frac{1}{P_s^2} - \frac{1}{P_0^2} \right)$$

**INITIAL PERIOD OF NS**

$$P_0 = \sqrt{\frac{24M\pi^2 R^2 P_s^2}{5P_s^2 (B_0'^2 R^3 \ln(B_0'/B_s) - 3Mv^2) + 24\pi^2 M R^2}}$$