SEMINAR

For binaries with general eccentricity *e*

$$t_{GW} = \frac{5}{256} \frac{c^5}{G^3} \frac{a^4 \left(1 - e^2\right)^{7/2}}{m_1\, m_2\, (m_1 + m_2)}$$

Peters 1964

Timescale depends on semi-major axis, eccentricity, masses

Timescale extremely long

EXERCISE: calculate tGW for 2 neutron stars
with mass equal to the Sun mass (1 Msun)
orbiting at the distance
between Sun and Earth (1 AU)

NS-NS merging time

G=6.67*1e-11 m^3/kg/s^2

1au=150 Mkm=1.5e11 m

c=300 000 km/s=3e8 m/c

M=M_sun=10^33 g=10^30 kg

G*M/c^2/a=6.7-11*10^30/9/10^16/1.5e11 m^3/s^2/m^3*s^2

G*M/c^2/a=5*10^-9

T=5/256/2*1.5e11/3e8 /(5e-9)^3 sec= 5*8 10^24 sec =1.5 10^18 yr>> t_U