

# Il cielo visto nei raggi gamma

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Fermi MASTERCLASS

# Ogni buona chiacchierata di astrofisica...

... dovrebbe, a mio parere, iniziare dalle Equazioni di Maxwell:

$$\begin{aligned}\nabla \cdot \vec{E} &= \frac{\rho}{\epsilon_0} = 4\pi k\rho & \oint \vec{E} \cdot d\vec{A} &= \frac{q}{\epsilon_0} \\ \nabla \cdot \vec{B} &= 0 & \oint \vec{B} \cdot d\vec{A} &= 0 \\ \nabla \times \vec{E} &= -\frac{\partial \vec{B}}{\partial t} & \oint \vec{E} \cdot d\vec{s} &= -\frac{d\Phi_B}{dt} \\ \nabla \times \vec{B} &= \frac{\vec{J}}{\epsilon_0 c^2} + \frac{1}{c^2} \frac{\partial \vec{E}}{\partial t} & \oint \vec{B} \cdot d\vec{s} &= \mu_0 i + \frac{1}{c^2} \frac{\partial}{\partial t} \int \vec{E} \cdot d\vec{A}\end{aligned}$$



# Il mio ufficio



*Old Tank at Flamengo Beach - Culebra (United States)*

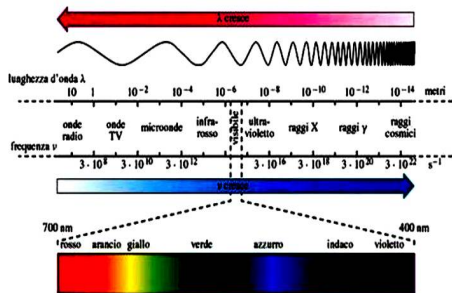


*Arecibo Radio Observatory - Puerto Rico (United States)*



# Lo spettro elettromagnetico

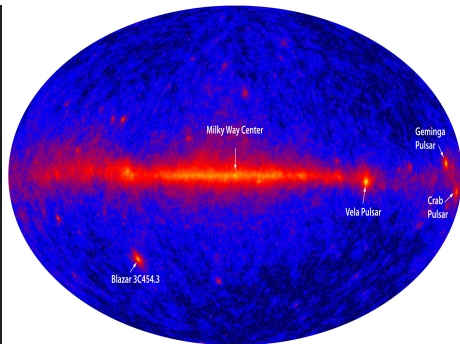
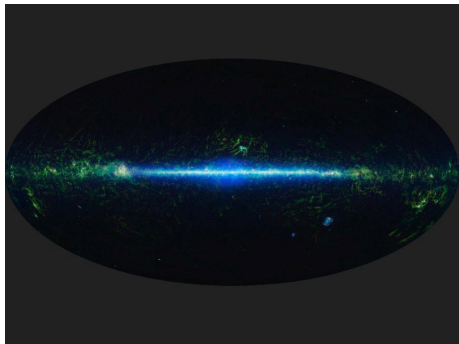
Onde luminose non sono come le onde sonore ma...



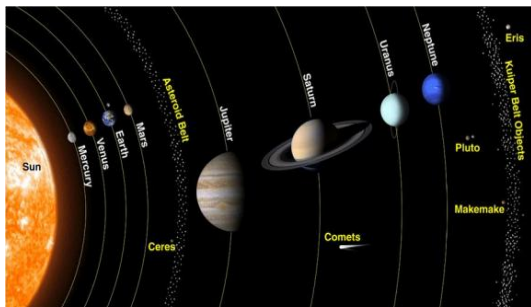
Pericoli?

# Lo spettro elettromagnetico

- vedere lo stesso oggetto celeste con occhiali diversi



Questa figura ha un errore?



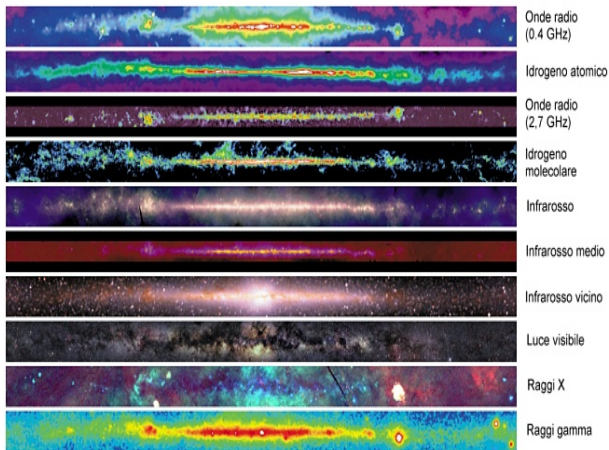
# Fuori dal sistema solare: la Via Lattea



# Fuori dal sistema solare: galassie a spirale

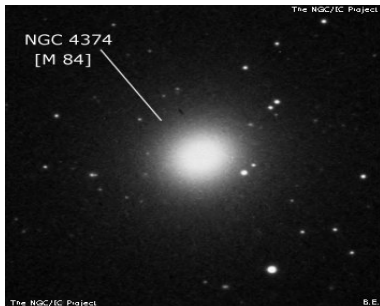


# Fuori dal sistema solare: la Via Lattea a diverse frequenze





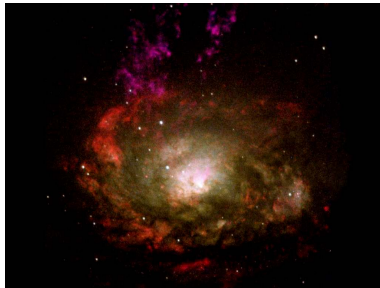
# Fuori dal sistema solare: galassie ellittiche



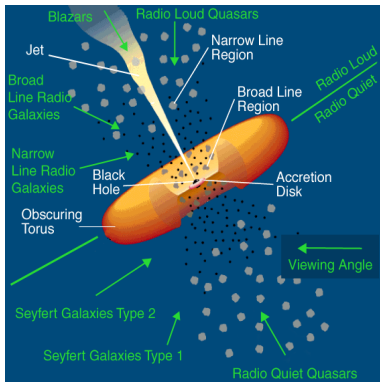
# Fuori dal sistema solare: galassie interagenti



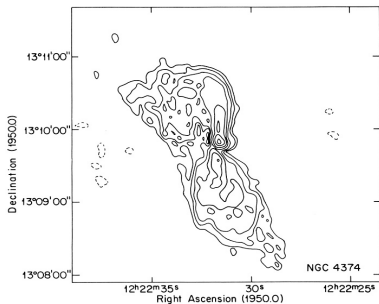
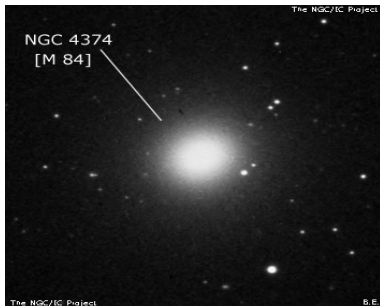
# Fuori dal sistema solare: galassie attive



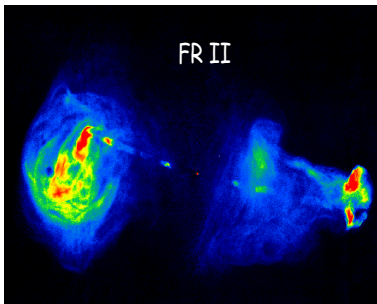
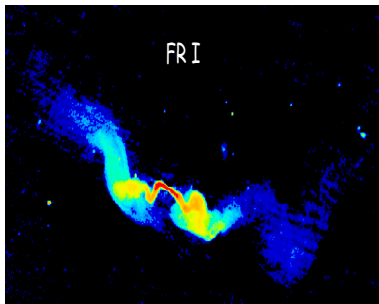
# L'idea di base: il modello unificato dei nuclei galattici attivi

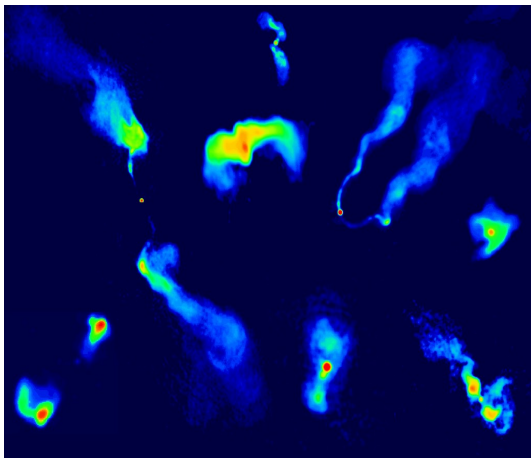


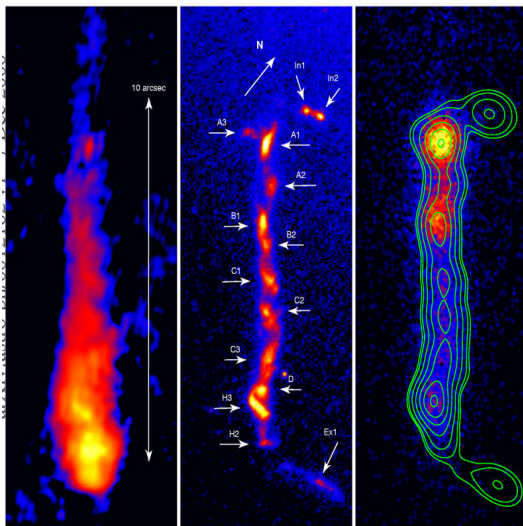
# Le radio galassie



# Classificazione delle radio galassie



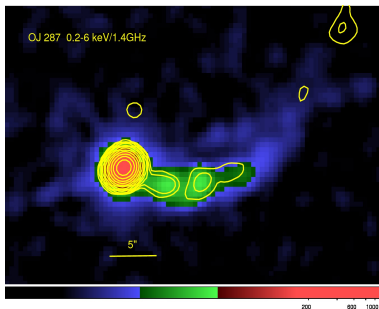




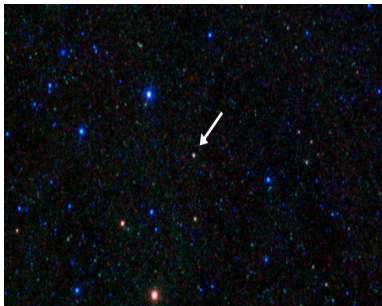


# Lucertole extragalattiche: un po' di storia

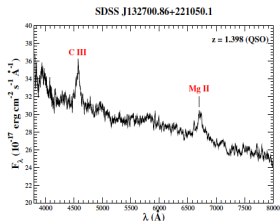
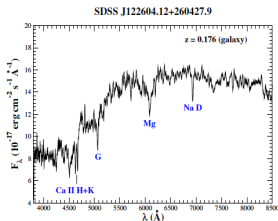
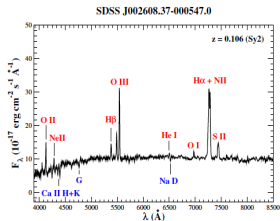
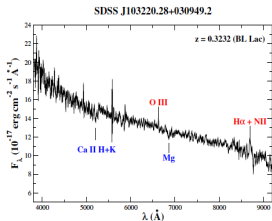
BL Lac objects .. mai sentito parlare di quasar???



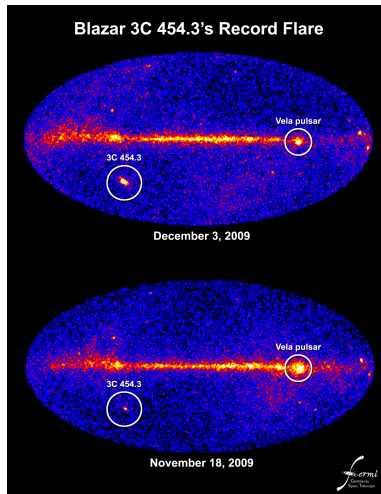
# Lucertole extragalattiche: un po' di storia



# Spettri elettromagnetici ...



# Variabilità ... anche nei raggi gamma



... grazie a tutti!