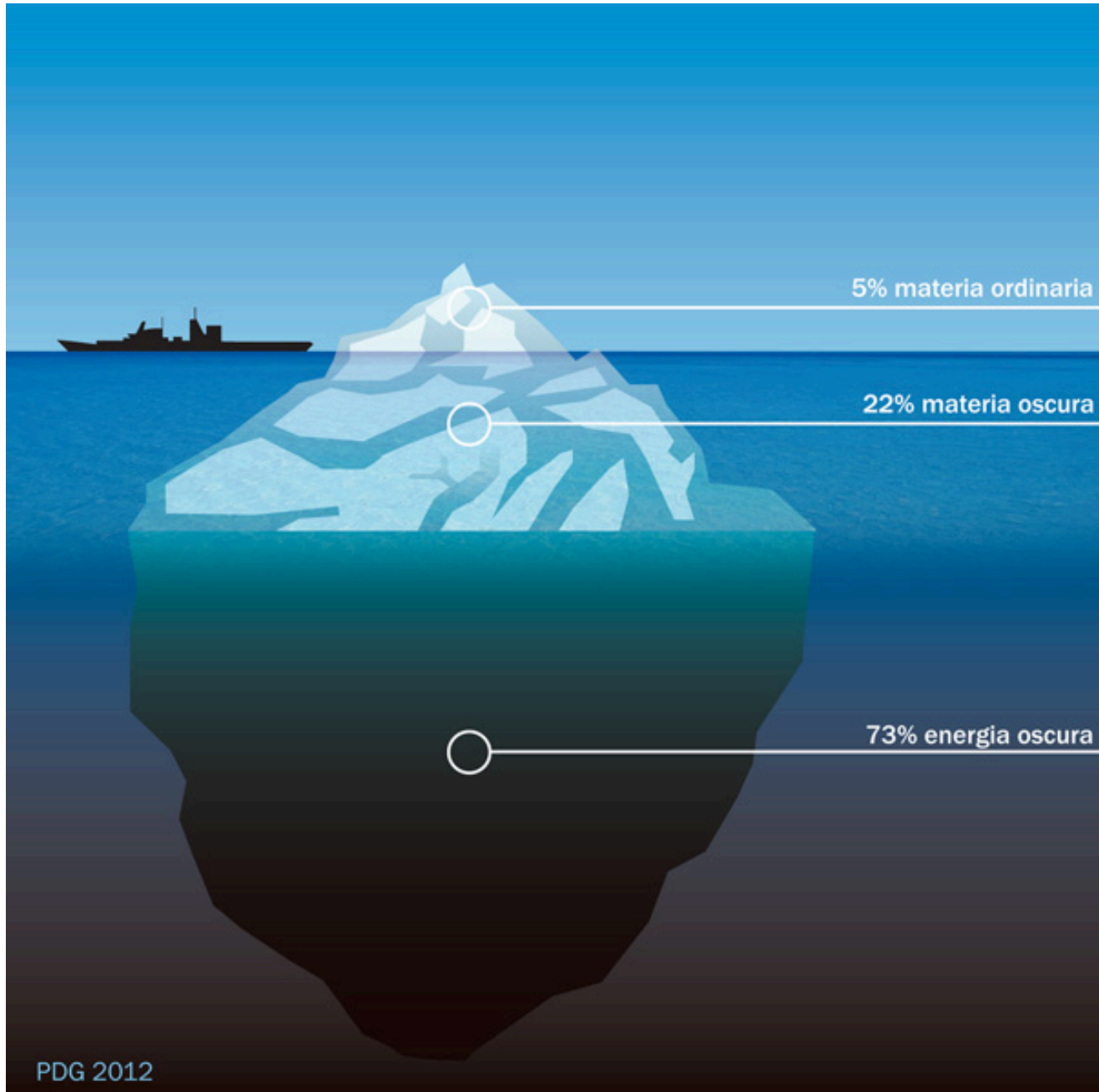


19 maggio 2020

Materia oscura

*del perché tutto quello che conosciamo non
basta a spiegare l'Universo che abitiamo*





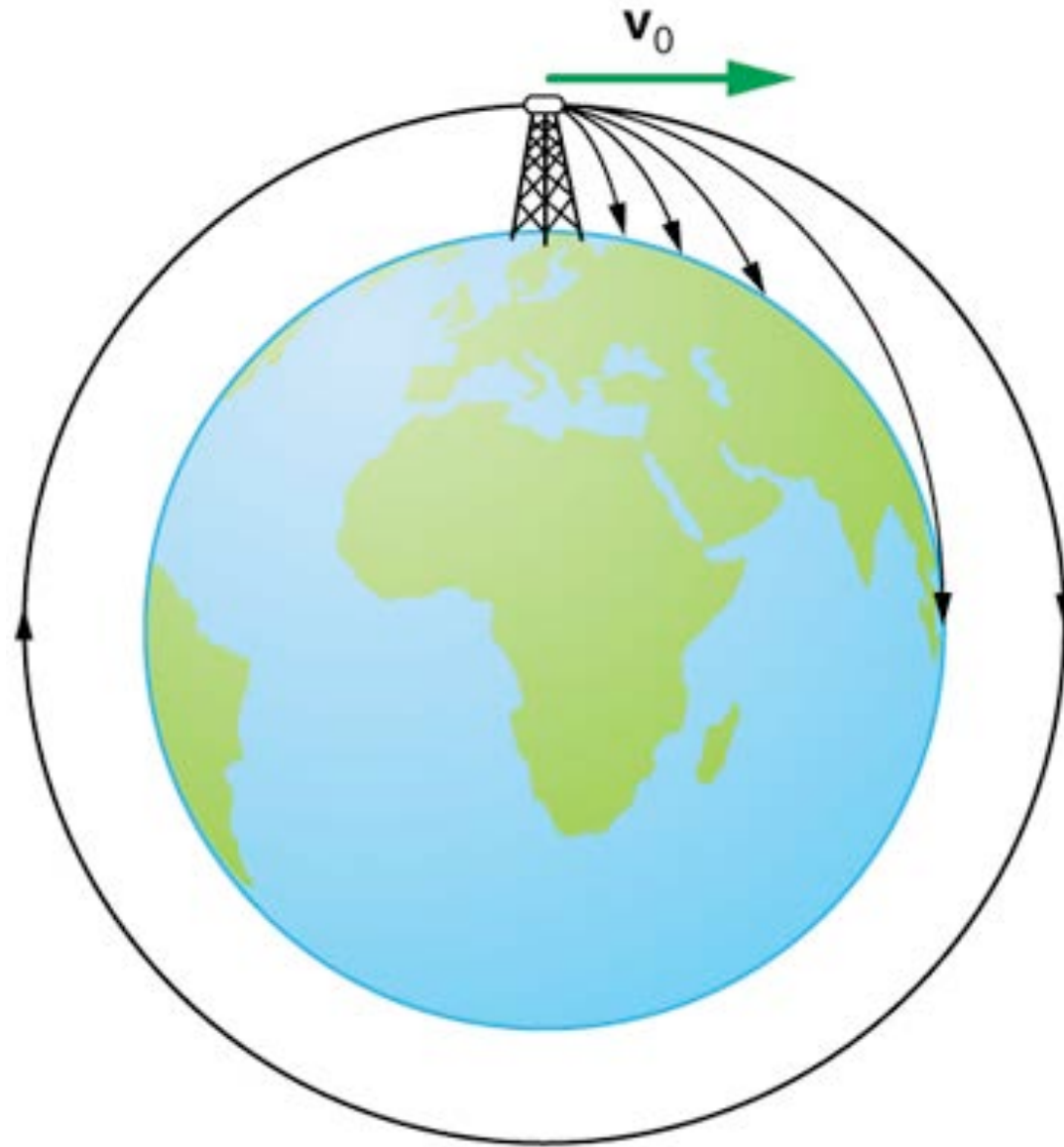
[PDG 2019:
Materia ordinaria 4.88%
Materia oscura 26.4%
Energia oscura 68.7%]

Isaac Newton

Illustrazioni di Agostino Iacurci



Isaac Newton



Fritz Zwicky



- Barbara Sciascia (INFN/LNF) -

Coma cluster [Abell 1656]



Mare e terra



Mare e terra



Mare e terra



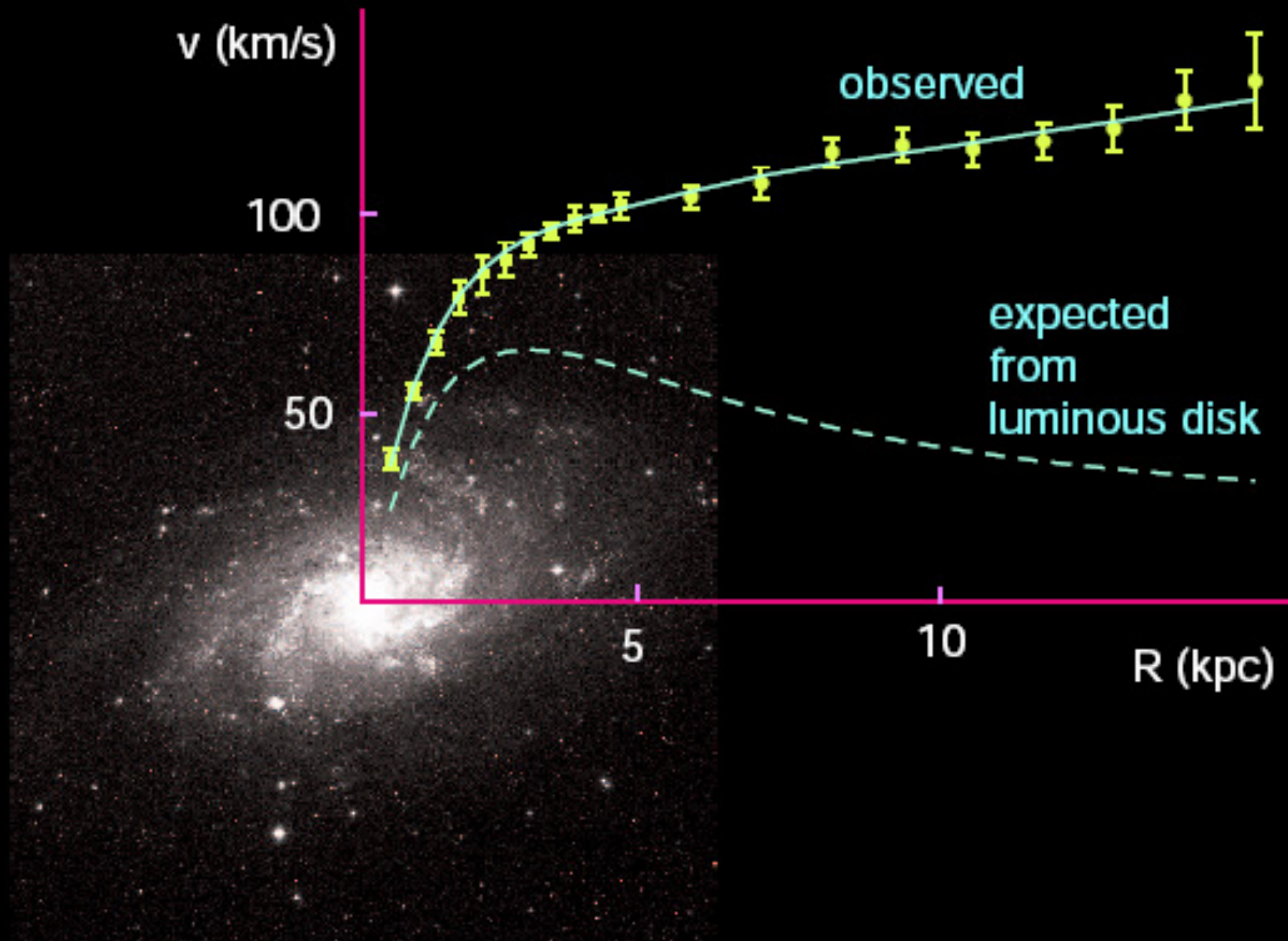
La signora dell'oscurità



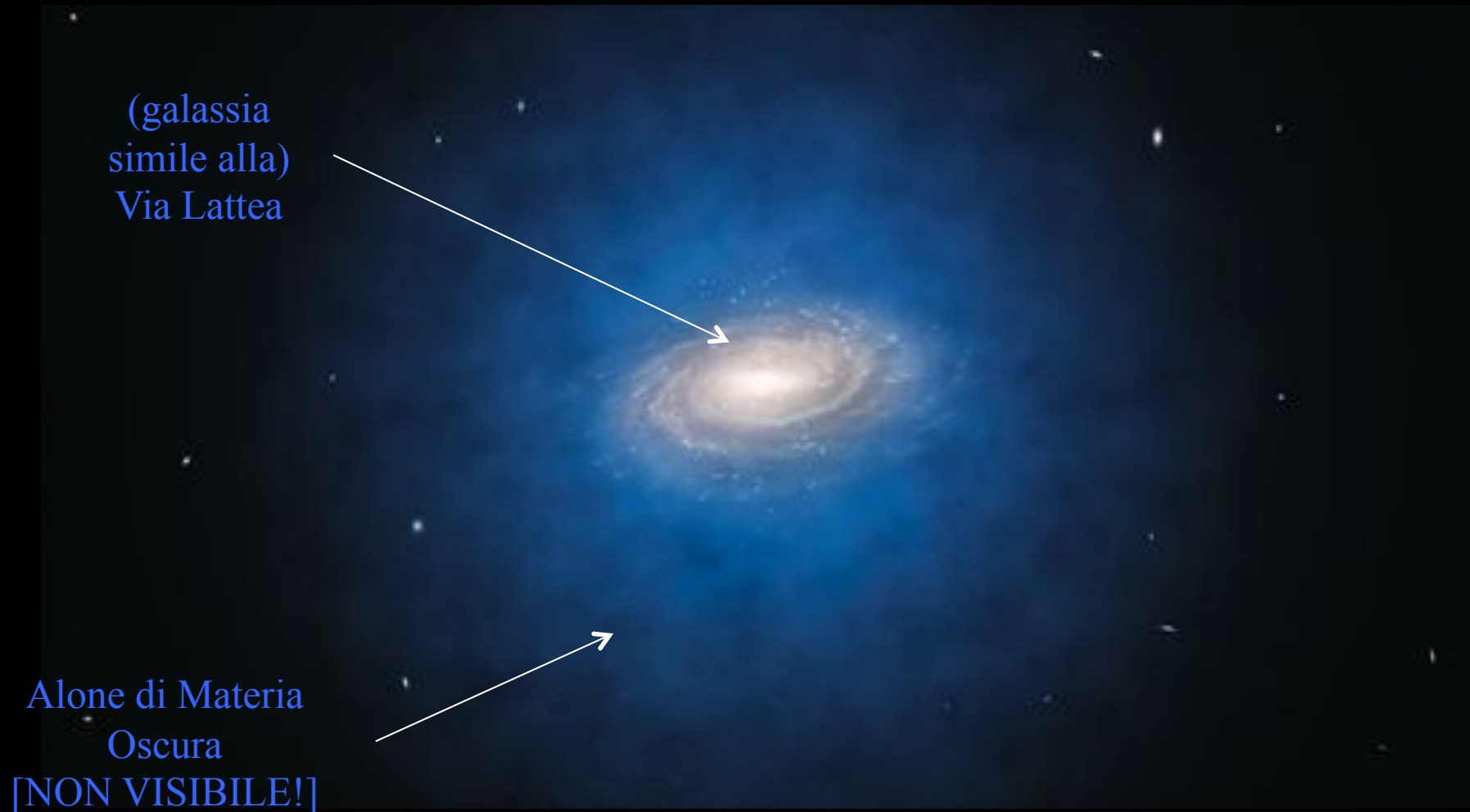
Vera Rubin, 1928 - 2016



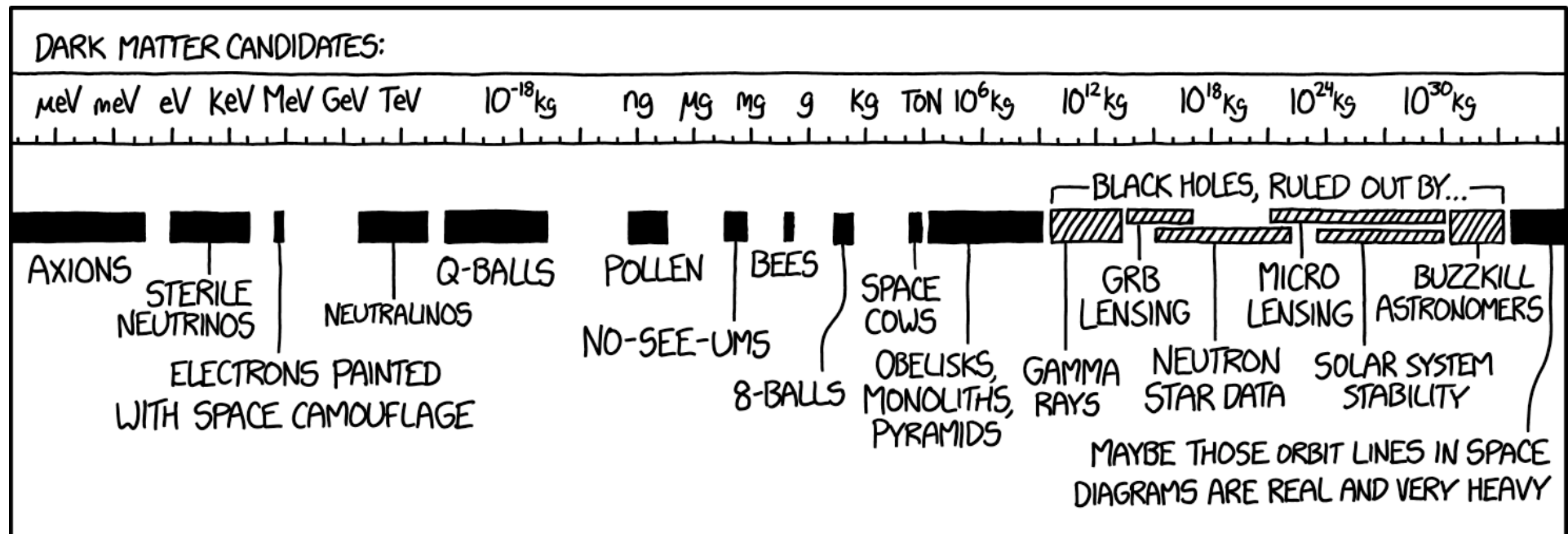
Curve di rotazione [galassia M33]



Materia e Materia Oscura



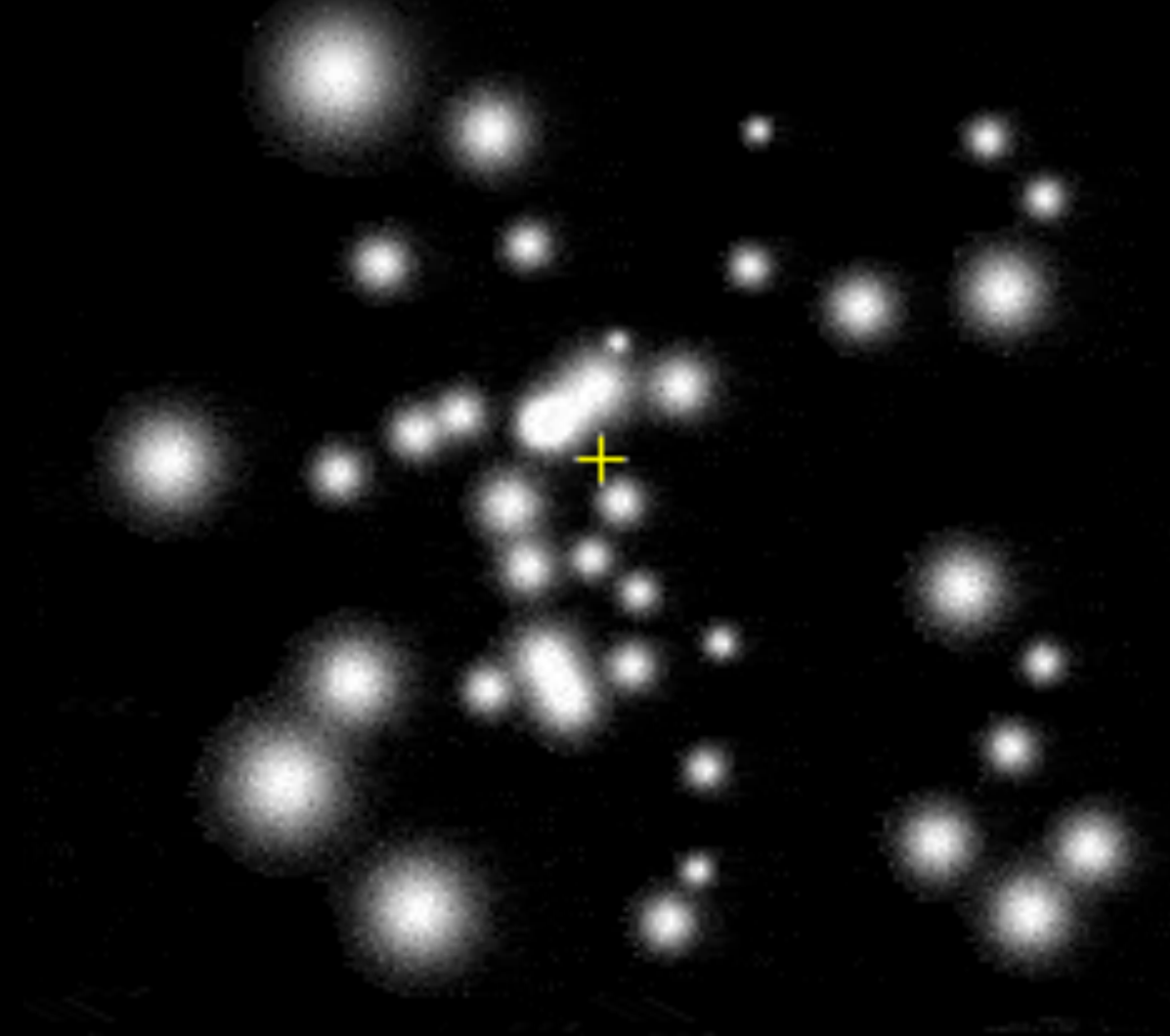
Materia oscura: ipotesi



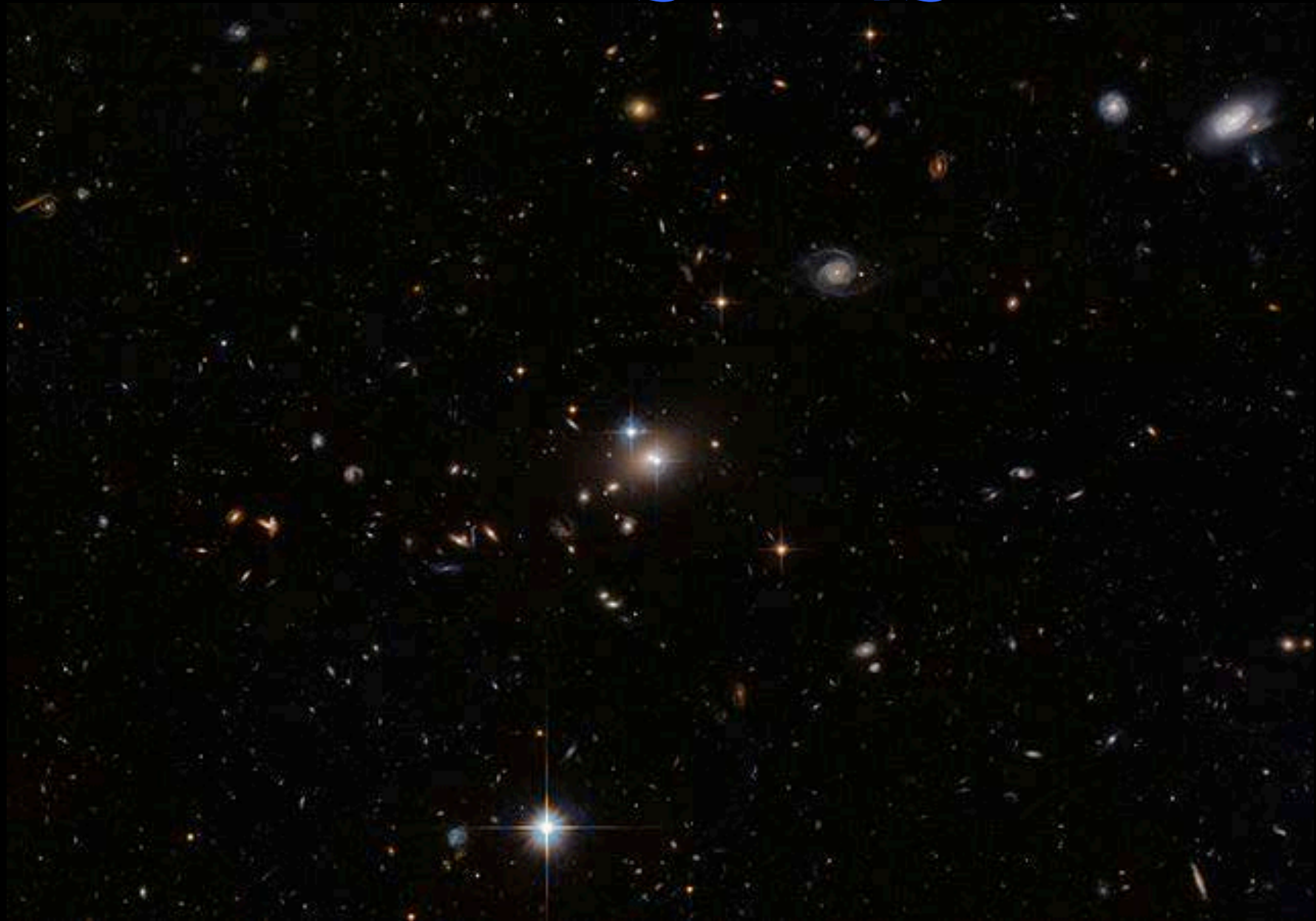
Al centro della Galassia

1992.1

10 light days

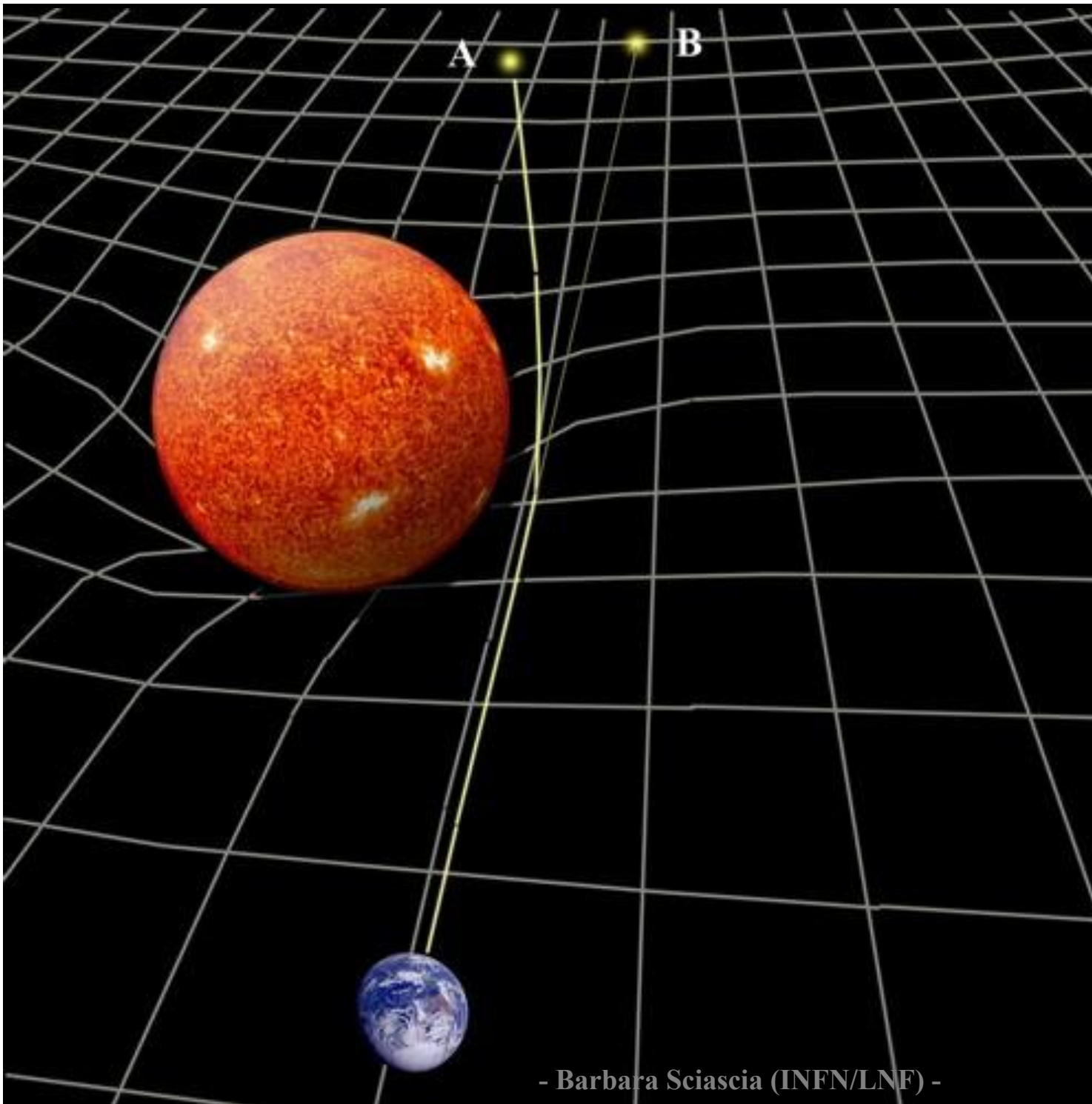


Twin Quasar [QSO 0957+561]

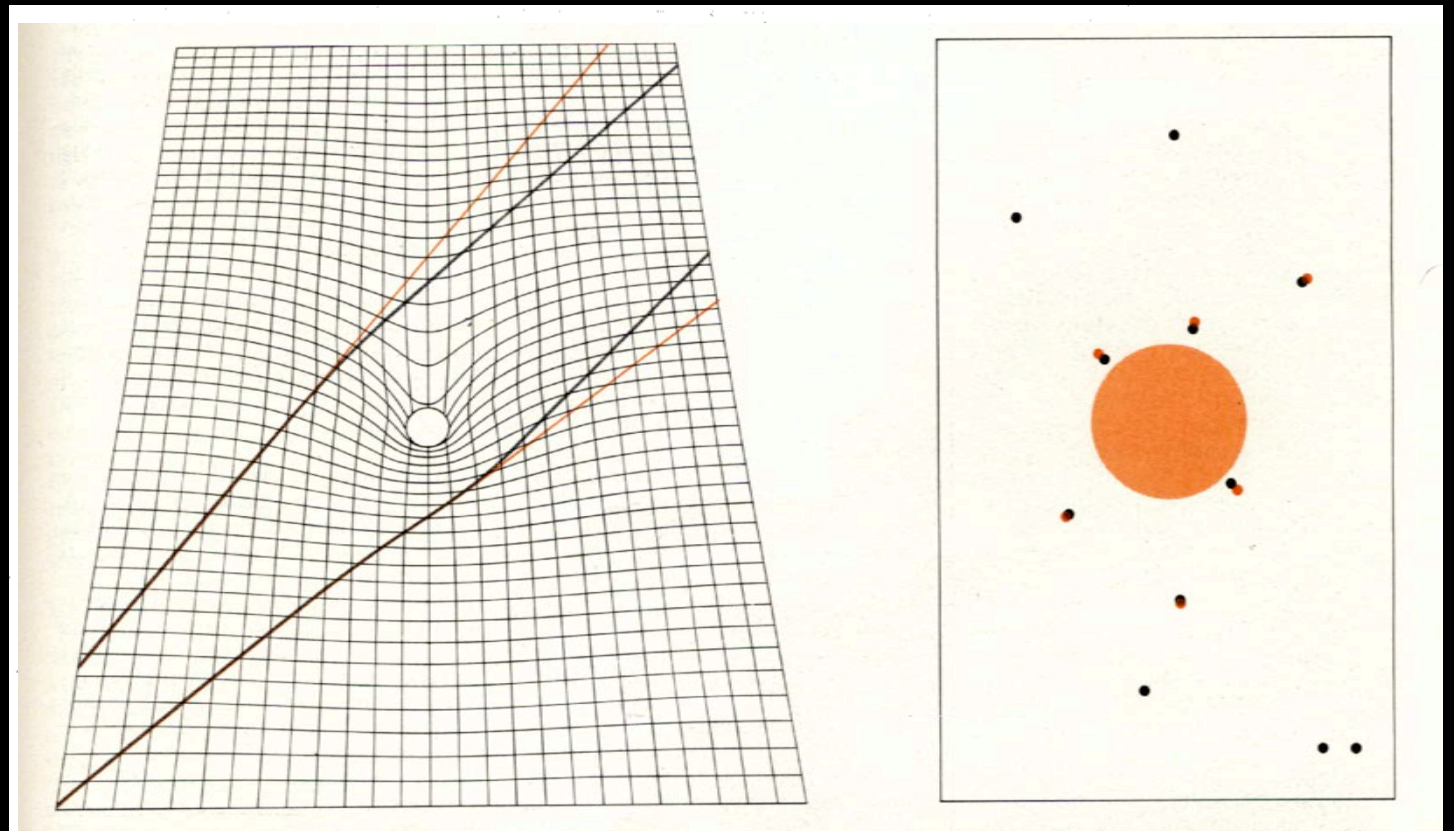


[By ESA/Hubble & NASA - <http://www.spacetelescope.org/images/potw1403a/>]

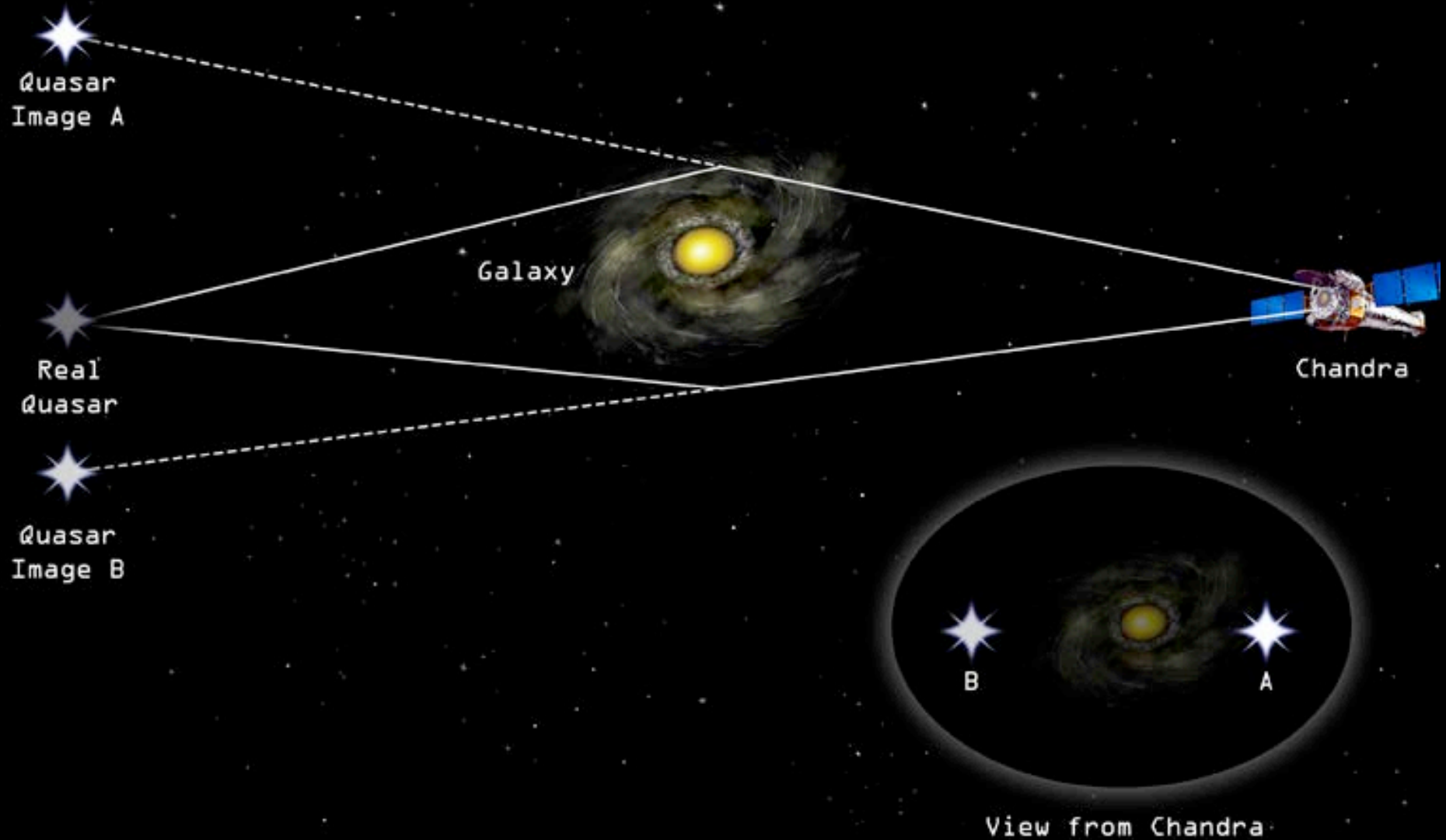
Lo spazio curvo

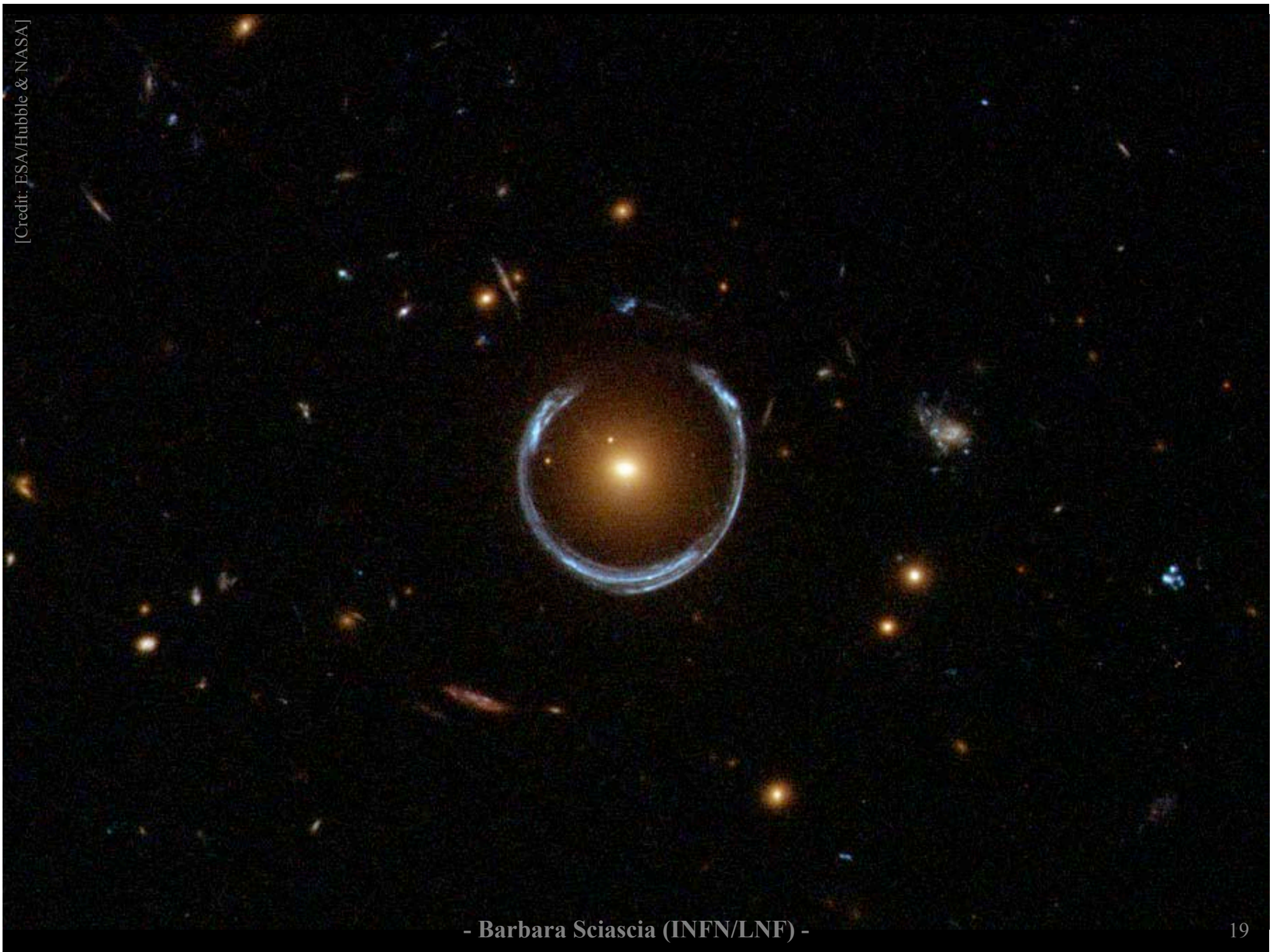


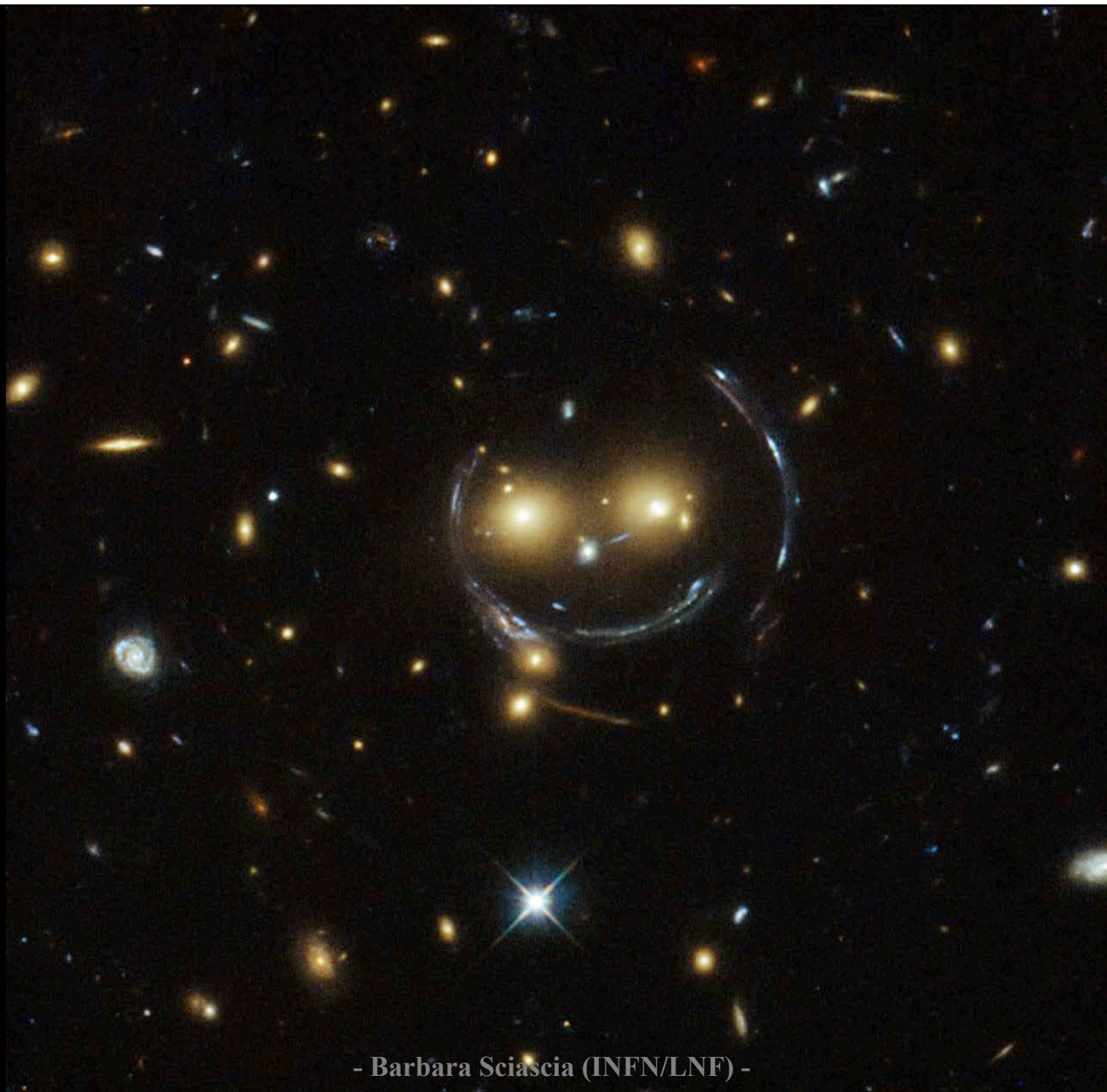
Lo spazio curvo



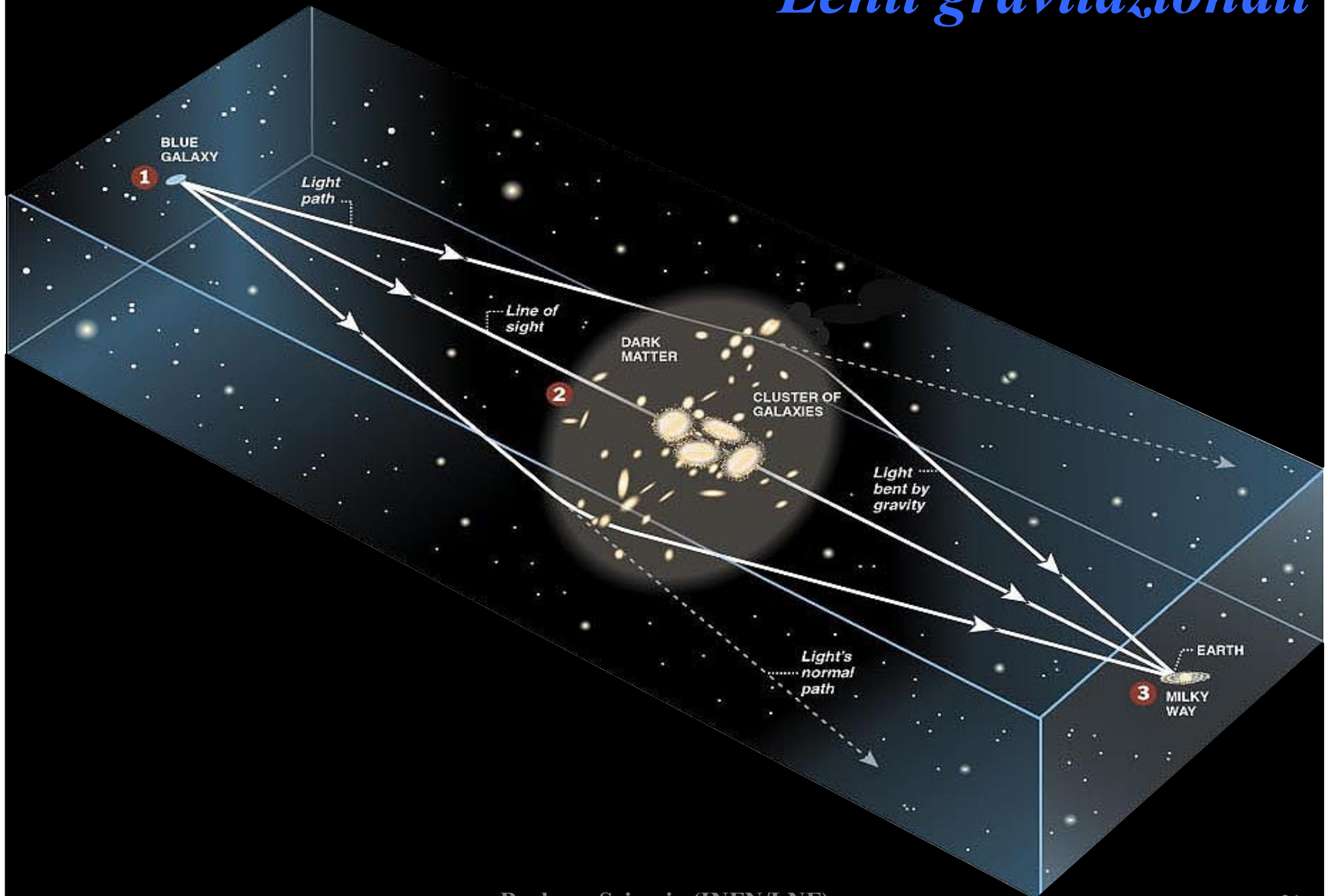
Lenti gravitazionali



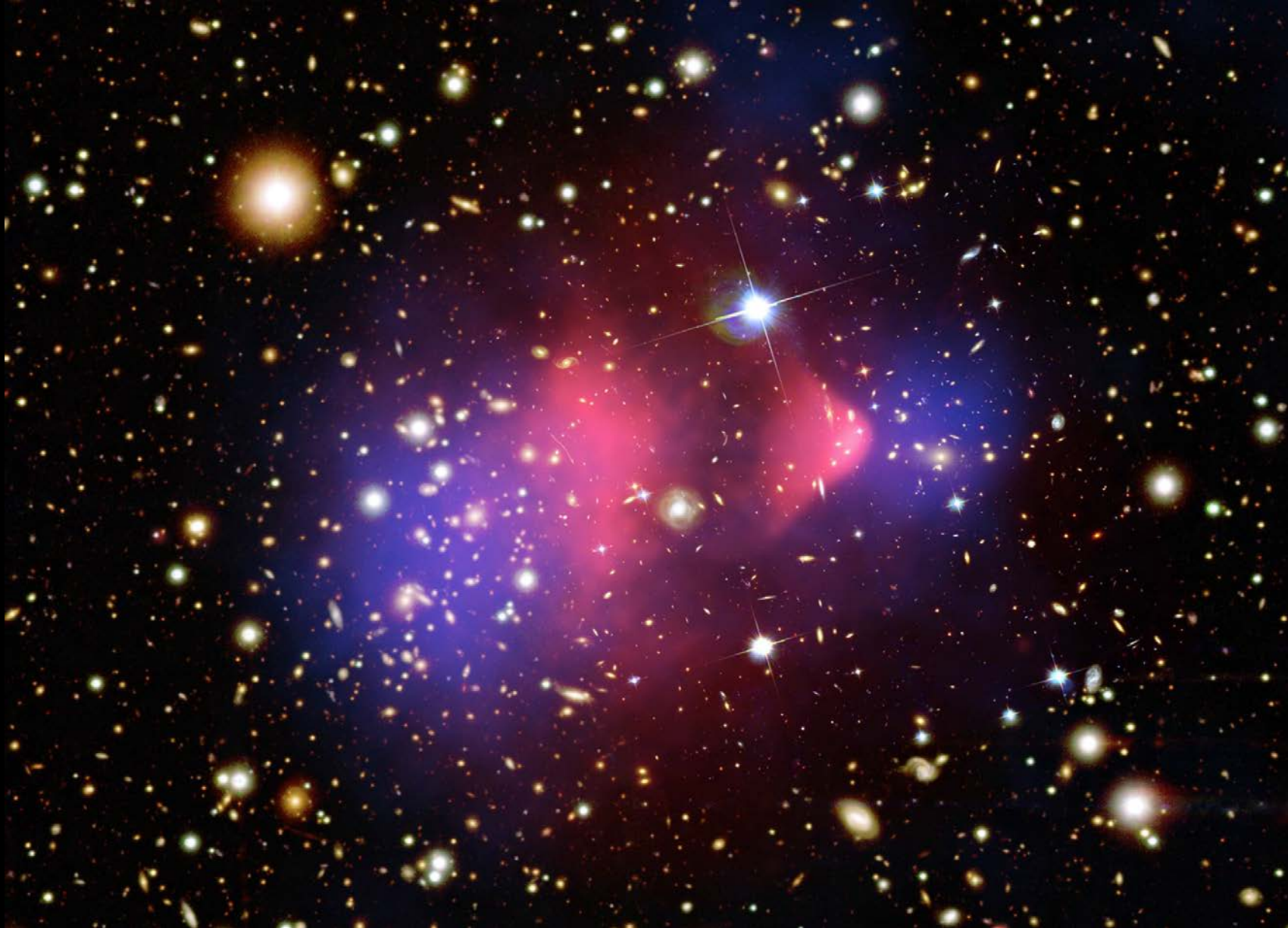




Lenti gravitazionali

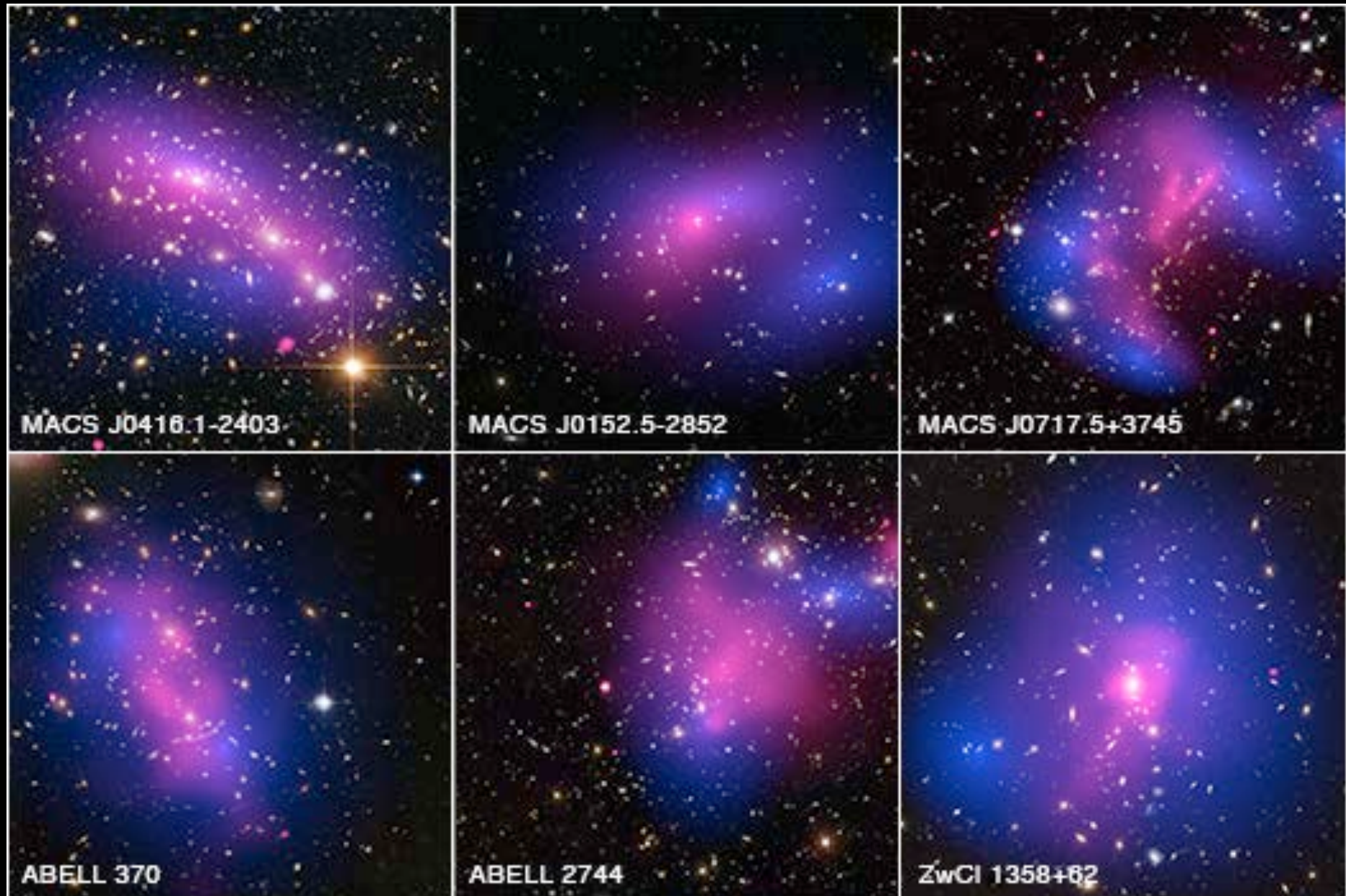


Materia e Materia Oscura



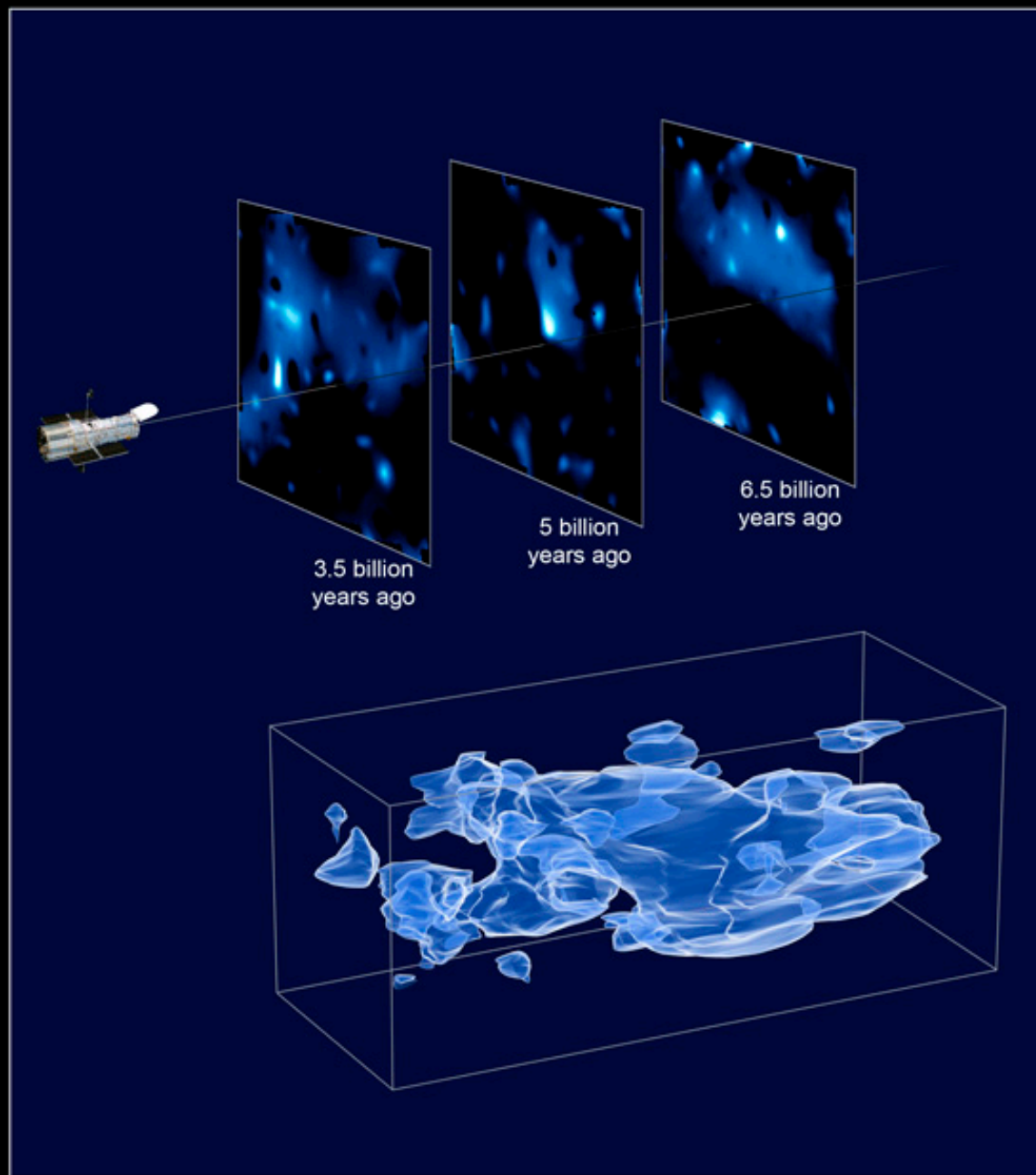
[Credit: X-ray: NASA/CXC/Ecole Polytechnique Federale de Lausanne, Switzerland/D.Harvey & NASA/CXC/Durham Univ/R.Massey; Optical & Lensing Map: NASA, ESA, D. Harvey (Ecole Polytechnique Federale de Lausanne, Switzerland) and R. Massey (Durham University, UK)]

Materia e Materia Oscura



Distribution of Dark Matter

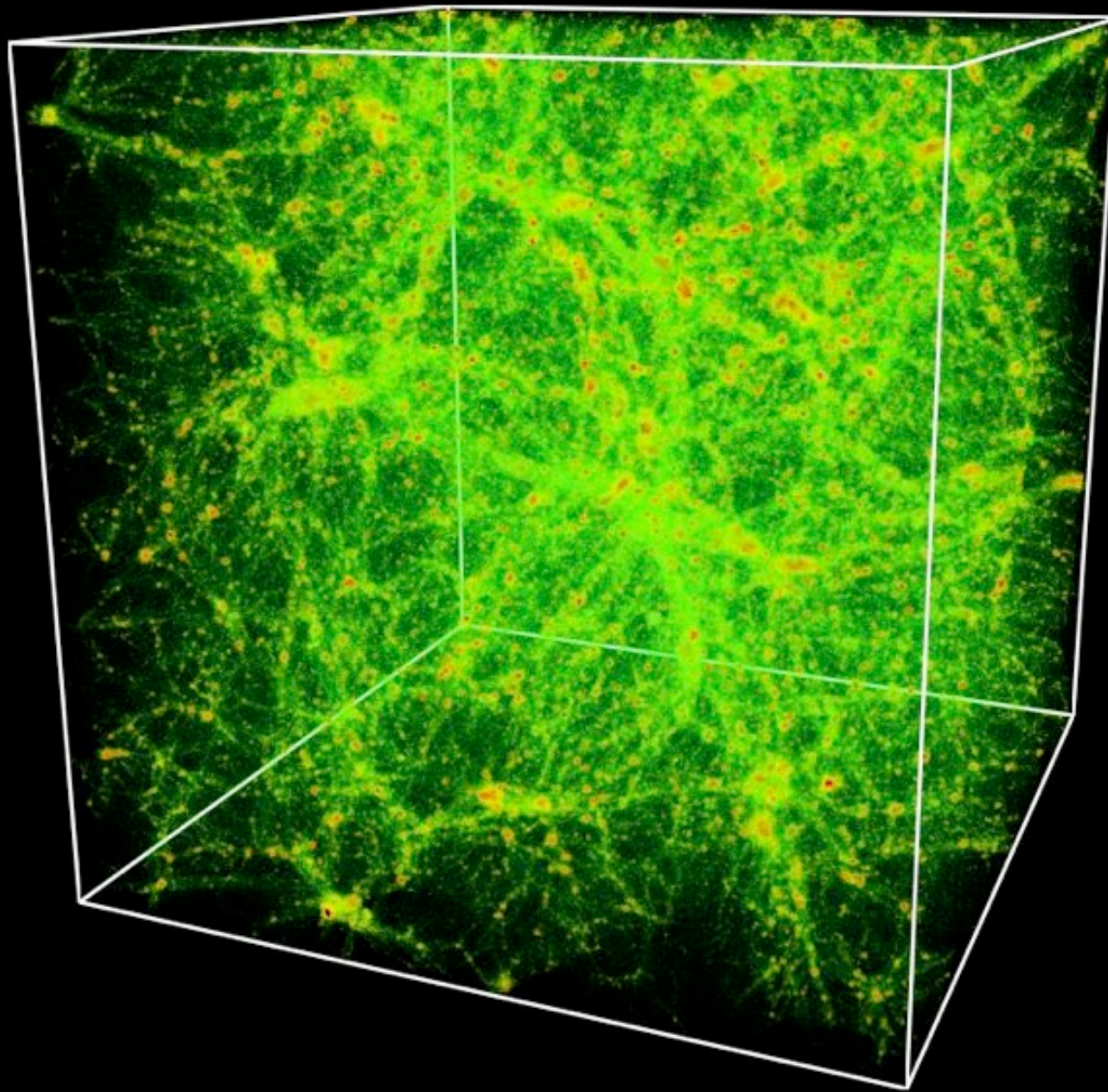
HST ■ ACS/WFC



NASA, ESA, and R. Massey (California Institute of Technology)

STScI-PRC07-01a

Materia Oscura



James Webb Space Telescope

<https://www.jwst.nasa.gov/>



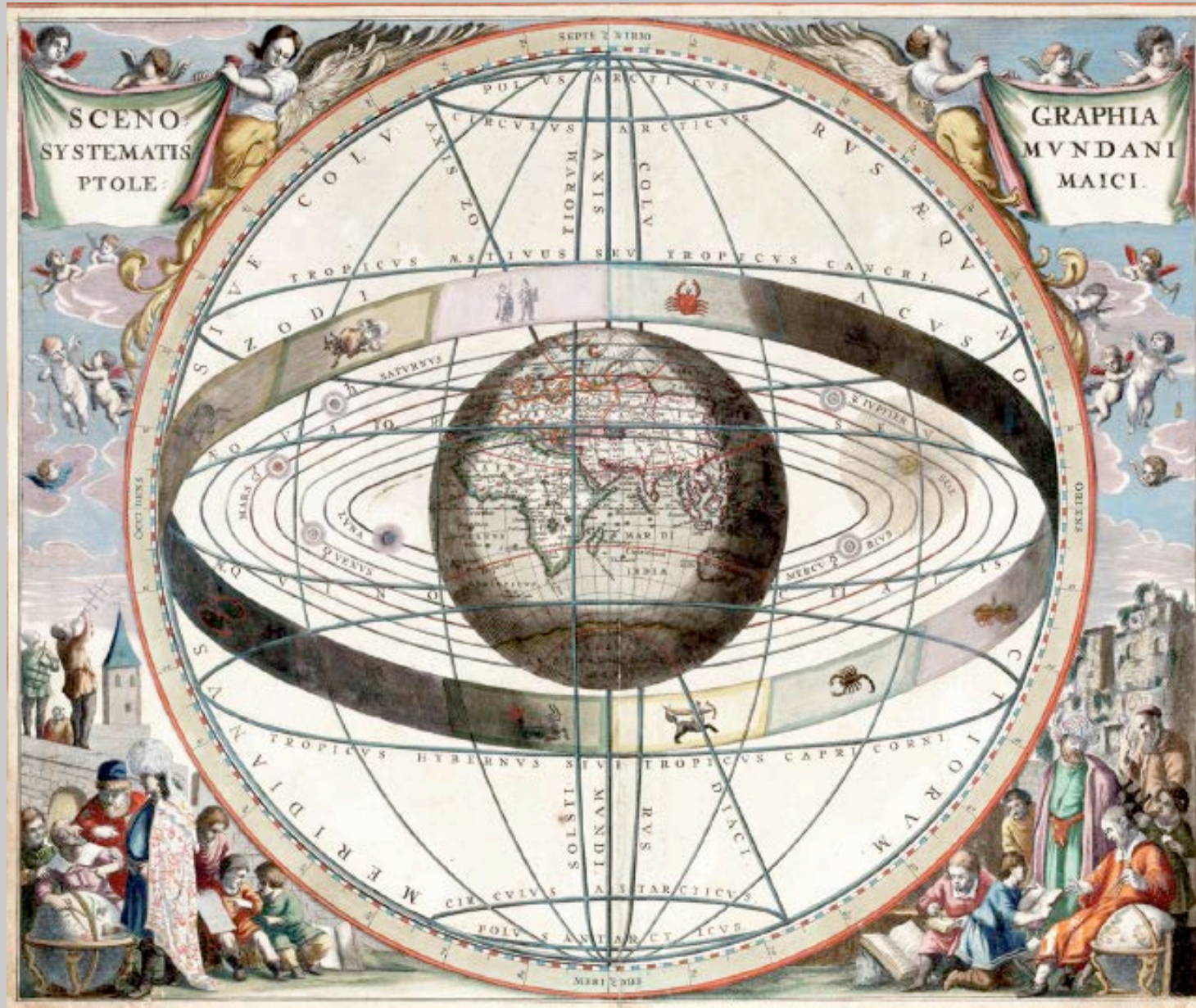
Webb, l'erede di Hubble



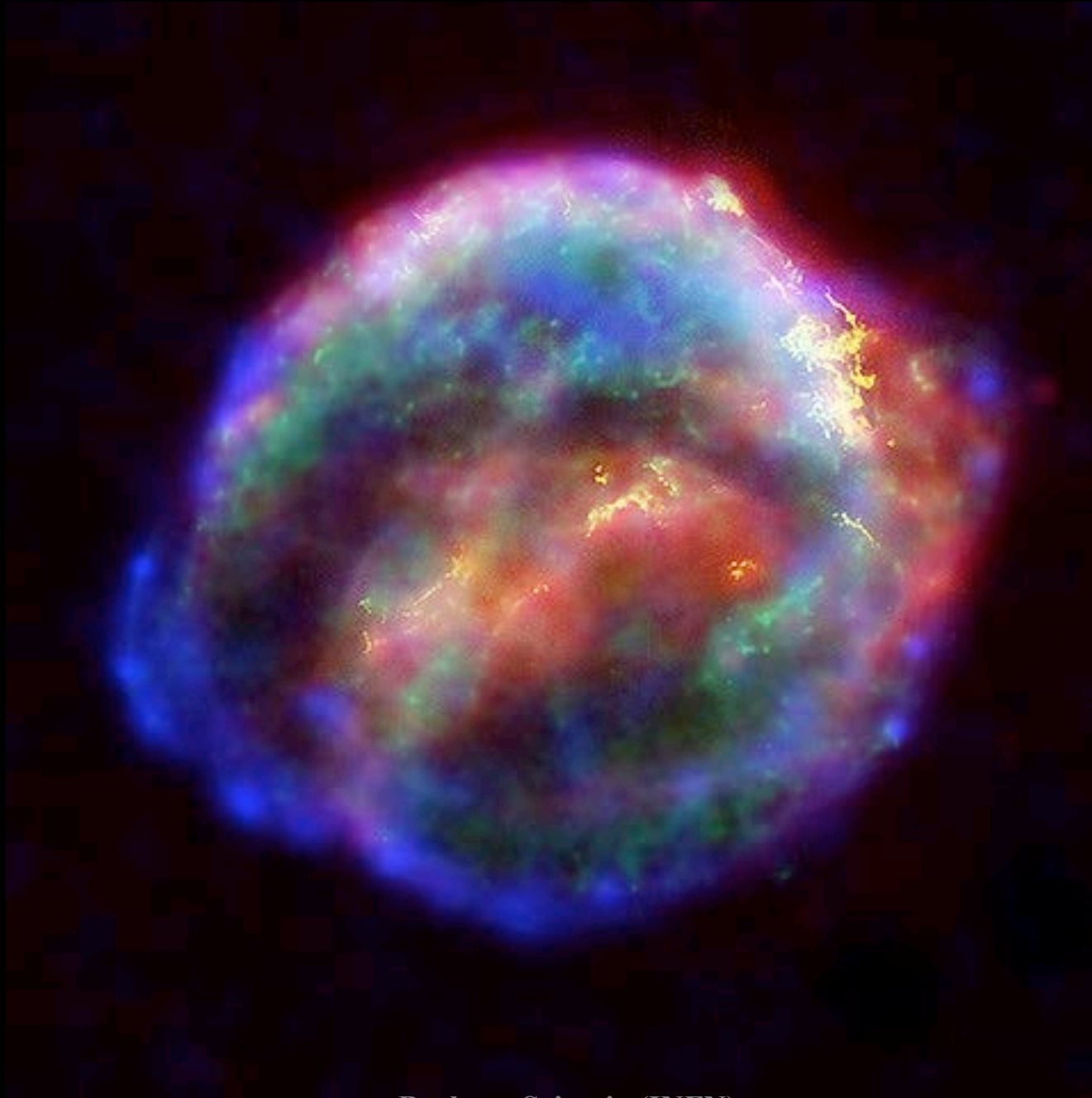
Energia oscura



L'Universo immobile

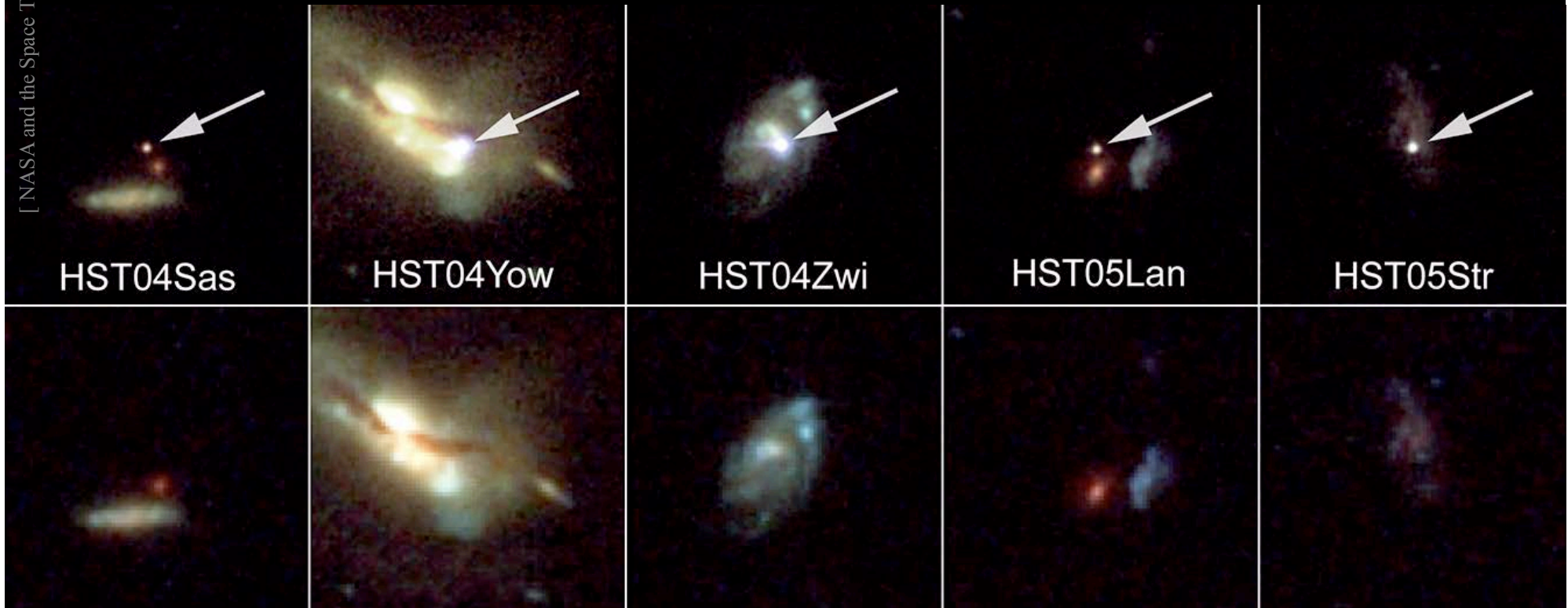


SN 1604 o stella di Keplero

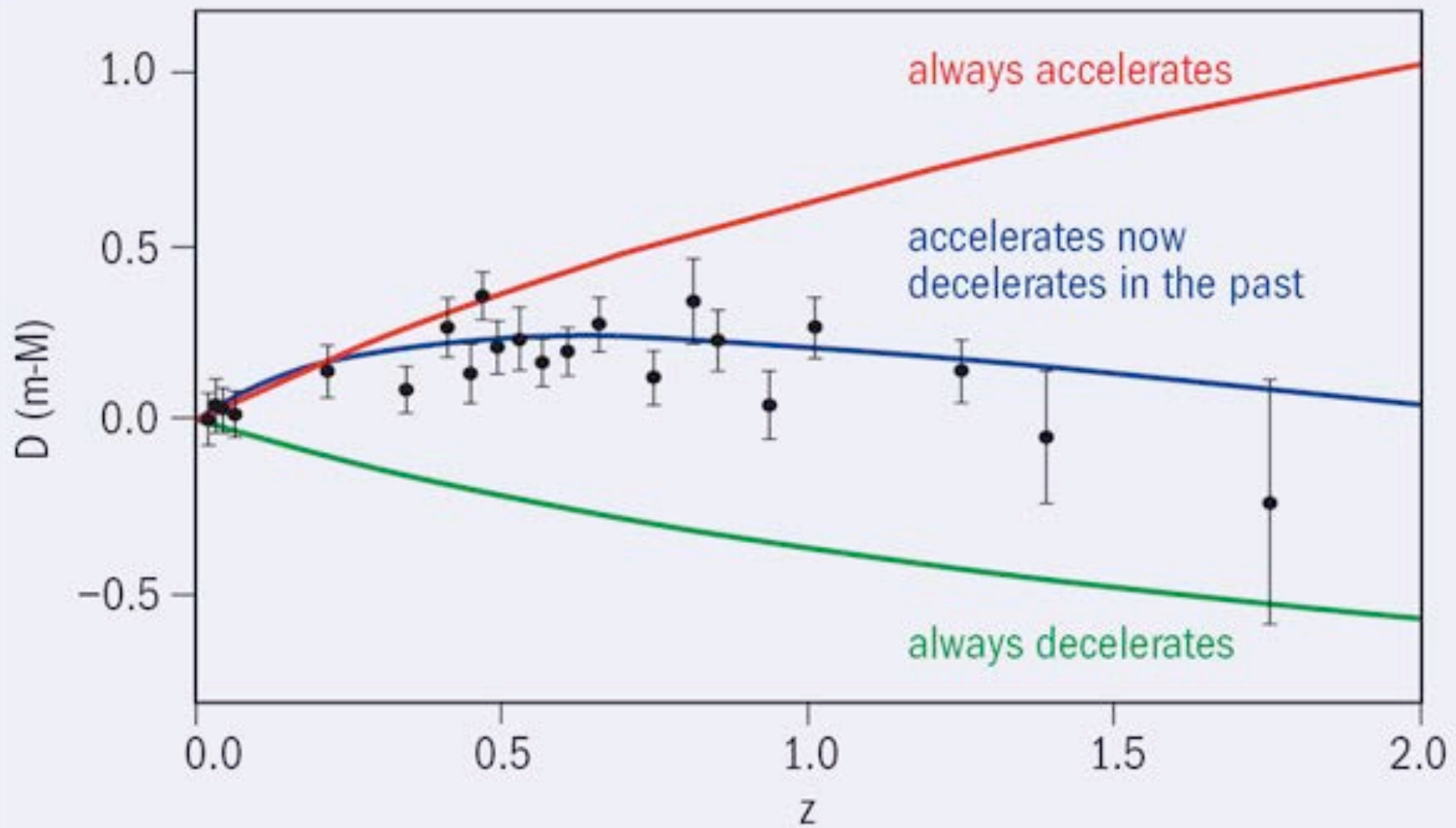


- Barbara Sciascia (INFN) -

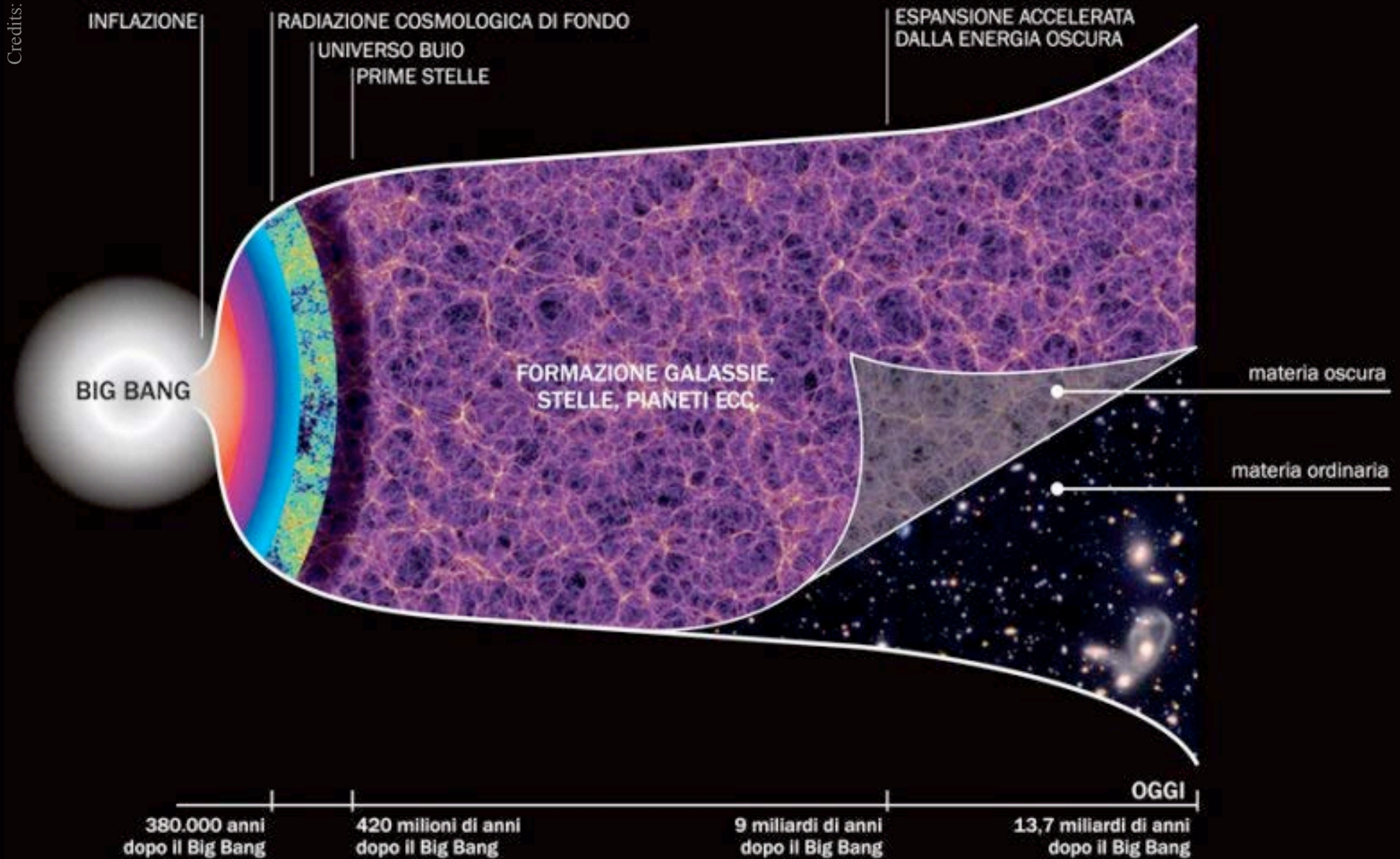
1998: Perlmutter, Schmidt e Riess



Espansione accelerata



Modello Standard Cosmologico



Approfondimenti:

- <https://www.lngs.infn.it/it/materia-oscuro>
- *Le Scienze*: https://www.lescienze.it/topics/news/materia_oscuro-711451/
- G. Bertone “Dietro le quinte dell’universo”, ed. Carocci

Ringraziamenti: alle professoresse Amalia Contessini e Fabiana Di Pasquale e agli alunni delle classi III [AS 2018/2019 e 2019/2020] della scuola media D. Bramante, IC S. Pio V, Roma, per i tanti spunti e suggerimenti per raccontare meglio la scienza difficile.

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