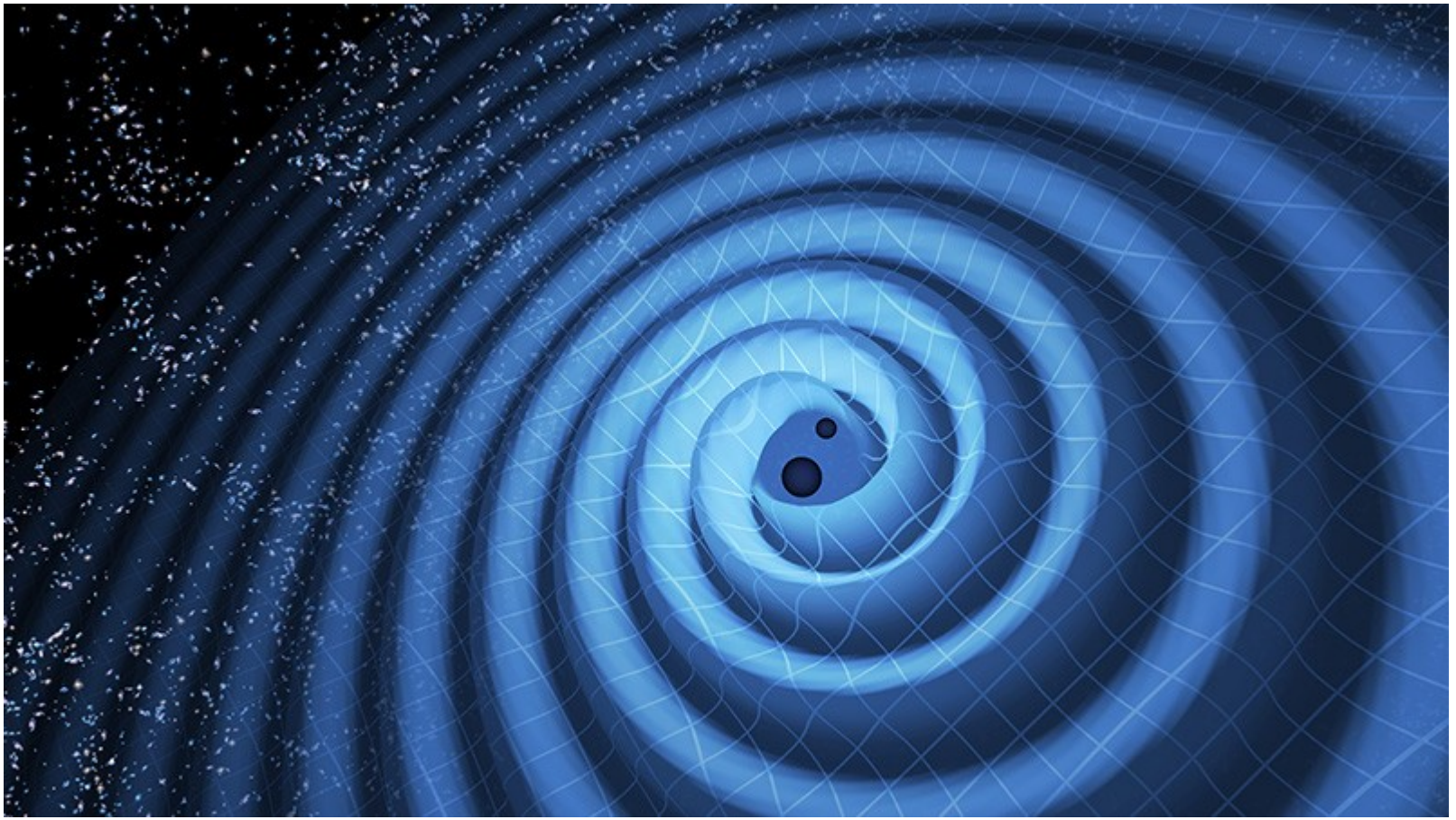
# Gravitational-Wave Astrophysics (GWA)



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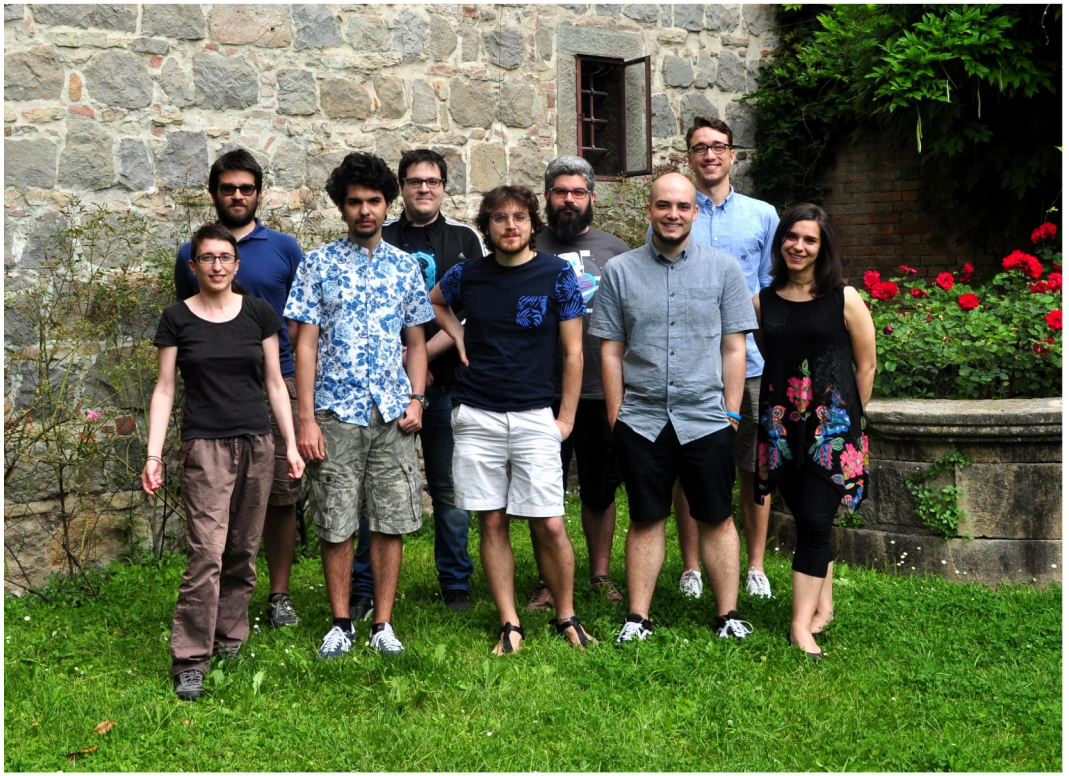
**Padova, April 5th 2018**

# Gravitational-Wave Astrophysics (GWA) Team



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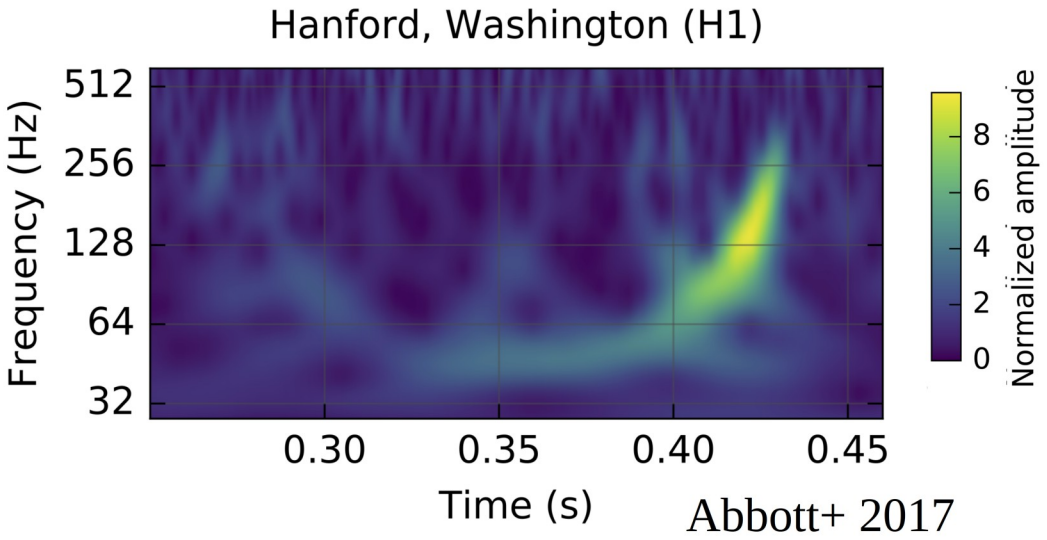
# Gravitational-Wave Astrophysics (GWA)

On September 14 2015 the two LIGO interferometers observed GW150914

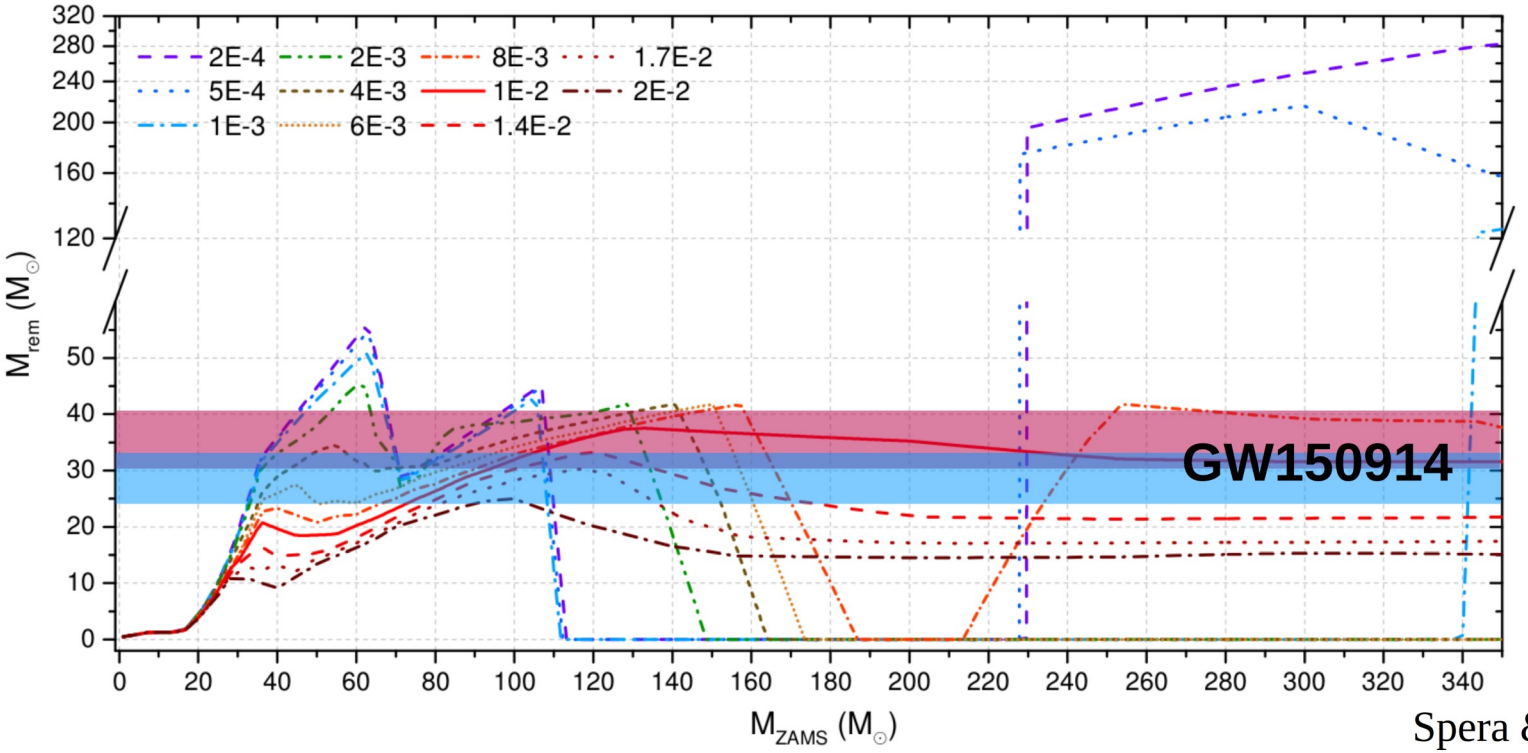



Abbott+ 2017

**We study the ASTROPHYSICAL formation channels of gravitational-wave sources**

# Gravitational-Wave Astrophysics (GWA)

The mass distribution of black holes and neutron stars through population-synthesis codes




Spera & Mapelli 2017

## Thesis 1: What is the impact of stellar rotation on the mass of compact obiects?

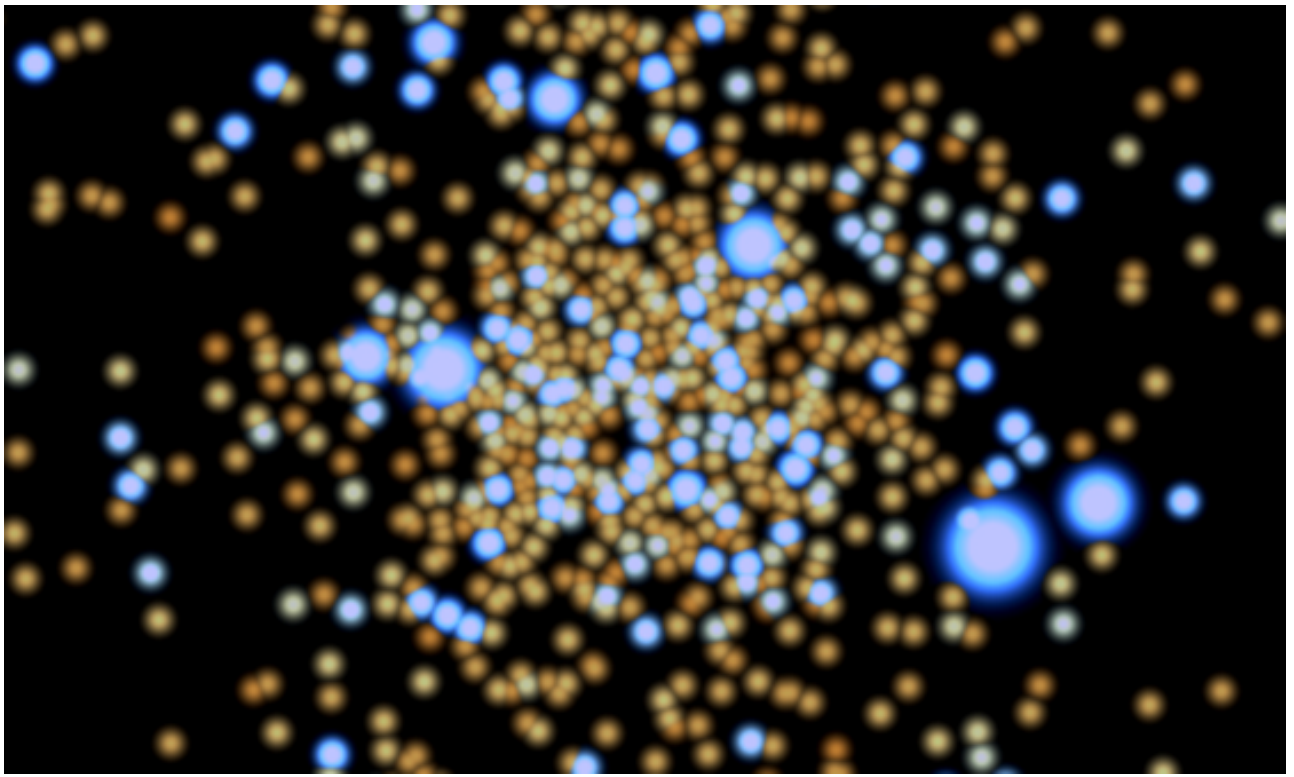
**Required knowledge**: Basic knowledge of stellar evolution, basic knowledge of programming (better if C++ and/or python)

**Choose this thesis if you like**: compact objects, stellar evolution, programming

**Example Reference:** Spera & Mapelli 2017, https://arxiv.org/abs/1706.06109

# Gravitational-Wave Astrophysics (GWA)

Black hole and neutron star binaries form also through dynamical processes in star clusters



## Thesis 2: What are the dynamical formation channels of black hole and neutron star binaries?

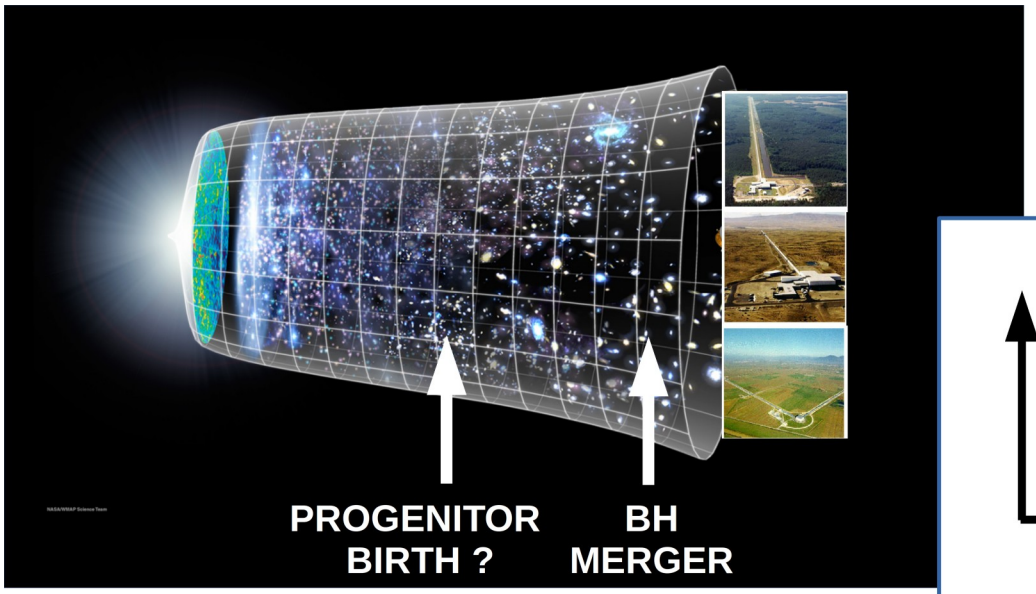
**Required knowledge:** Basic knowledge of programming (better if C++ and/or python)

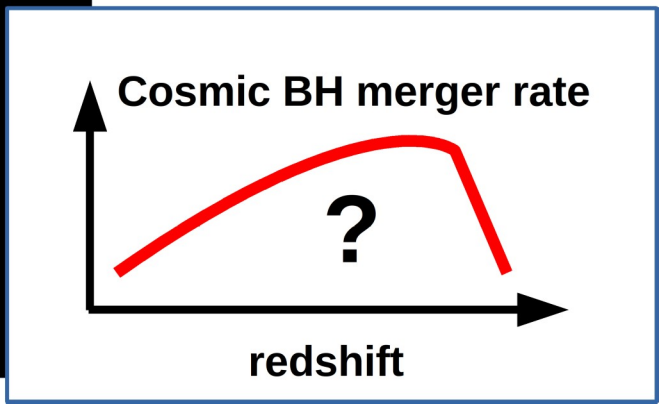
**Choose this thesis if you like:** stellar dynamics, compact objects

**Example reference:** Mapelli 2016, https://arxiv.org/abs/1604.03559

# Gravitational-Wave Astrophysics (GWA)

Black holes and neutron stars merging in the LIGO-Virgo instrumental horizon (redshift z<0.4) might have formed at much higher redshift



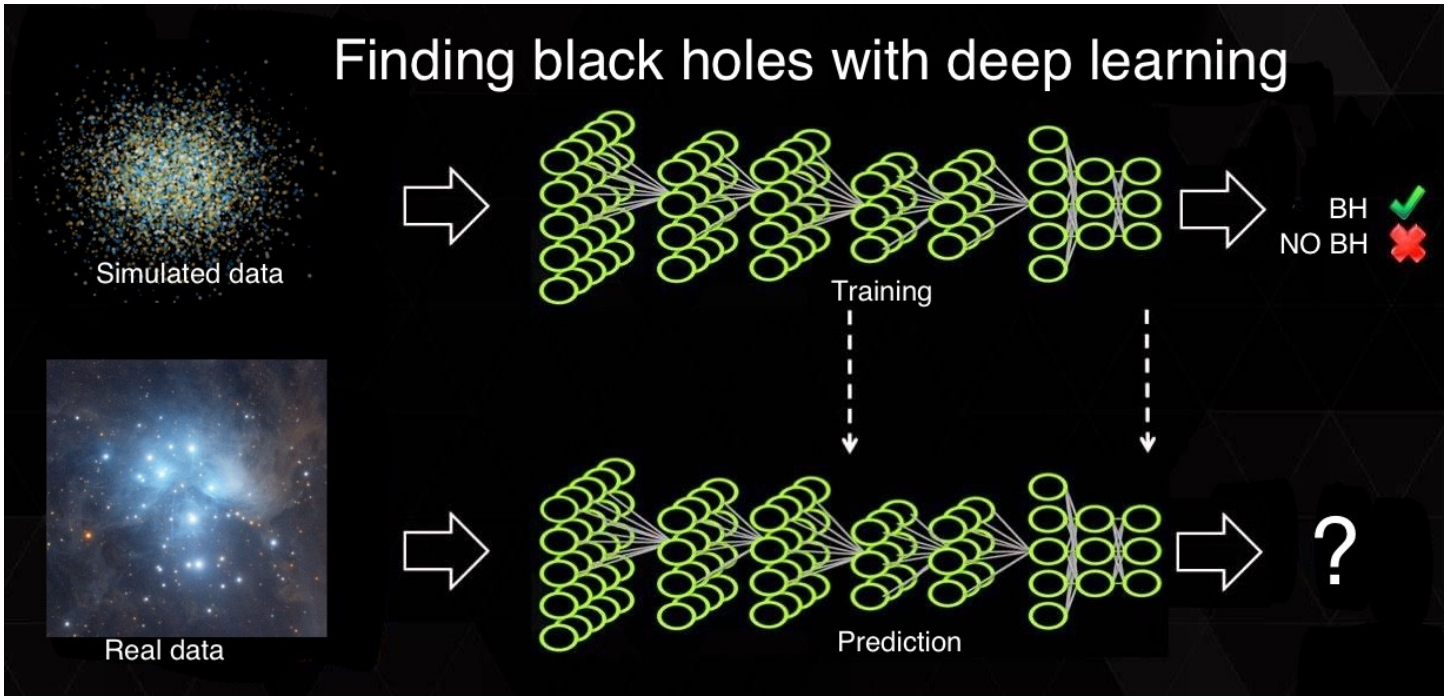

## Thesis 3: What is the merger rate of black holes and neutron stars across cosmic time? What are their host galaxies?

**Required knowledge:** Basic knowledge of programming (better if python), basic knowledge of cosmology and galaxy formation

**Choose this thesis if you like:** compact objects, cosmology

**Example Reference:** Mapelli+ 2017, https://arxiv.org/abs/1708.05722

# Gravitational-Wave Astrophysics (GWA)




## Thesis 4: Finding intermediate-mass black holes with deep learning

**Required knowledge:** Basic knowledge of programming

**Choose this thesis if you like:** machine learning, compact objects

**Example Reference:** Pasquato & Chung 2016, https://arxiv.org/abs/1602.00993