

My current research focus on theoretical astrophysics for black holes, including accretion and jet formation around black holes, black hole shadow images, and comparisons between theoretical observable features and observation.

### Techniques used in study

General Relativistic Magnetohydrodynamics (GRMHD)

General Relativistic Radiative Transfer (GRRT)

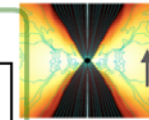
### Theory :

#### Black Hole

##### Accretion flow/ Jet

black hole spin/ spacetime structure  
flow velocity  
spatial/energy distribution of electrons  
magnetic configuration  
electron heating/cooling

GRMHD



GRMHD model of black hole accretion/jet

black hole spin direction

#### Other Observables

spectra  
light curves  
jet width etc.

#### Modelled Observables

#### Ray-Tracing

##### null geodesic

photon trajectories  
around a non-rotating  
black hole

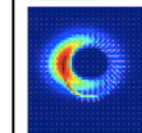
##### Radiation Transfer

emission/ absorption/ polarization  
light-crossing time correction  
energy shift

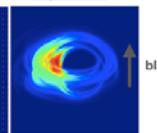
GRRT

#### Modelled image

Phenomenological  
model +  
Polarized GRRT



GRMHD numerical  
simulation +  
Unpolarized GRRT



black hole spin  
directions

#### Modelled Visibility

compare model with EHT observations

### Observation :

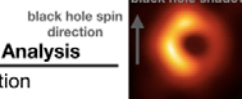
#### VLBI observation

array configuration  
instrument (antenna gain,  
polarization leakage etc.)  
observational duration  
weather

#### Observed Visibility

#### Data Analysis

calibration



#### Theoretical interpretations

(First result of Event Horizon Telescope Collaboration)

#### Image

**Hung-Yi Pu**, Assistant Professor

Department of Physics

hyu@ntnu.edu.tw

### Background:

PhD in Physics, National Tsing Hua University,  
Taiwan, R.O.C.

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Ministry of Education

National Taiwan Normal University



### Publications

- H.-Y. Pu, Takahashi, M. Properties of Trans-fast Magnetosonic Jets in Black Hole Magnetospheres. The Astrophysical Journal, 892, 1, 2020.
- Event Horizon Telescope Collaboration et al. First M87 Event Horizon Telescope Results. V. Physical Origin of the Asymmetric Ring. The Astrophysical Journal Letters, 875:L5, 2019.
- H.-Y. Pu and A. E. Broderick. Probing the Innermost Accretion Flow Geometry of Sgr A\* with Event Horizon Telescope. The Astrophysical Journal, 863:148, 2018.

