Compact Object Group

Kwak, Lee, Hui, van Putten

Motivation

- Consultants recommended more active collaboration among members in the center
- "Compact Object (CO) Group"
  - Focusing on observational and theoretical aspects of CO
  - X-ray & gamma-ray observations (Hui)
  - Gravitational wave (Lee & van Putten)
  - Hydrodynamics simulations (Kwak)

Strategy

- Find and define problems at the detailed level
  - Gravitational wave with Gamma-Ray Bursts
  - X-ray bursts with expected data from NICER
- Coordinate students' involvement
  - Match the students with the projects that need the collaborate efforts of the members
  - Long-term projects for ph.D students

Current Status

- X-ray bursts (XRBs)
  - Lee and Kwak (Dr. Young-Min Kim)
  - Photospheric radius expansion (PRE) XRBs requiring X-ray observations with high temporal resolution (e.g., NICER)
  - Constrain mass and radius of neutron stars
  - Related to both RAON and XFEL experiments

Collaboration Plan
(High Priority)

- XRBs: Hui & Prof. Lupin Lin + Lee & Kwak
  - Analysis of NICER data
  - Companion observations
- Gravitational waves: van Putten & Lee (+ Kwak, Hui)
  - Theory and data analysis
  - Connection to GRBs: observation and theory (simulation)
- Other X-ray/Gamma-ray sources (Hui & Lin)
  - Contribution from theory

Collaboration Plan
(Low Priority)

- Collaboration with other sub-groups
  - Hydrodynamics/PIC simulations
  - RAON and XFEL experiments
- Collaboration outside CHEA
  - GW and GRB (afterglow observations)
  - X-ray observations (e.g., Prof. An at Chungbuk Nat'l Univ.)

Modeling XRBs

Candidate Configuration (Ferraro+ 2015)

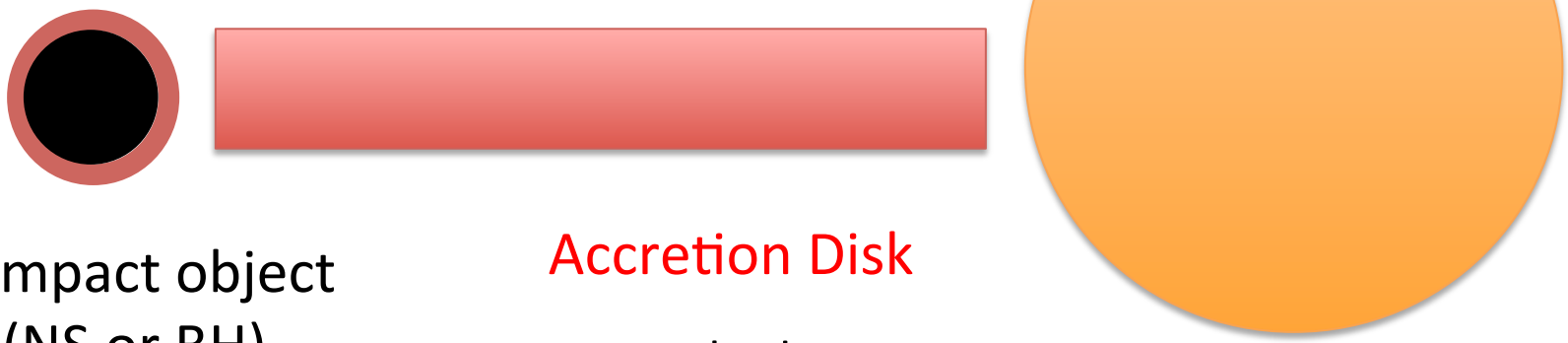
a (orbital separation) = 5.2 Rsun

Porb = 0.9 days

Roche Lobe radius = 1.78 Rsun

Rsun = 7×10^5 km

KeV = 1.2×10^7 K



Compact object
(NS or BH)

Mns = 1.4 Msun

Rns = 10 km

Accretion Disk

Energy budget:
fraction of
(G Mns m_p)/Rns
= 200 MeV

Companion

Mcomp = 0.9 Msun

Rcomp = 1.7 Rsun

Teff = 5440 K