

Beijing International  
Summer School  
The Physics and  
Evolution of AGNs



Saturday, 3 September 2011 – Friday, 9 September 2011

IHEP, Beijing

## Scientific Programme

## 1. Observations of AGN: 2 lectures

- (1) Basic observations, definition of AGNs
- (2) Discovering AGNs
- (3) AGN samples

## 2. Black holes and accretion physics: 4 lectures

- (1) Black holes: general properties
- (2) Spherical accretion
- (3) Accretion disks
- (4) Radiation Inefficient Accretion Flows (RIAFs)

## 3. Physical processes in AGN gas and dust: 4 lectures

- (1) The physics of ionized gas
- (2) The motion of ionized gas
- (3) Thermal and non-thermal processes in AGN gas
- (4) AGN dust

## 4. Main components of AGN: 4-5 lectures

- (1) The BLR and the NLR
- (2) Measuring BH mass part 1: Reverberation mapping
- (3) Highly ionized gas
- (4) Broad and narrow absorption lines + outflows
- (5) Central obscuration, torus and MIR emission
- (6) The central disk (SED+ X-ray emission)

## 5. The AGN family: 5 lectures

- (1) Type-I and type-II AGN
- (2) Radio loud and radio-quiet AGN
- (3) Low luminosity AGN and LINERs
- (4) Unification schemes

## 6. AGN and their hosts: 5-6 lectures

- (1) low- $z$ : AGN+host
- (2) high- $z$  AGN+host
- (3) SF galaxies
- (4) SF in AGN hosts
- (5) Nuclear star clusters
- (6) Measuring BH mass part 2: Comparison with  $\Sigma^*$  and bulge mass
- (7) Scaling relationships

## 7. Galaxy formation and evolution - highlights: 5 lectures

- (1) Structure formation
- (2) Assembly and properties DM halos
- (3) Hot and cold gas accretion
- (4) Star formation and feedback
- (5) Galaxy mergers and secular evolution
- (6) Bimodality and the formation of different types of galaxies
- (7) Cosmic SF history and evolution of galaxy LF and MF

## 8. BH formation and BH mergers: 3 lectures

- (1) Pop III stars and remnant BHs (light seeds)
- (2) Direct collapse (heavy seeds)
- (3) Star clusters, stellar processes (heavy seeds)
- (4) BH mergers, binary BHs, gravitational radiation, kicks
- (5) Origin of SMBH spin

## 9. Cosmic evolution of SMBHs: 4-5 lectures

- (1) Soltan arguments and the continuity equation
- (2) Soltan arguments and the continuity equation
- (3) The LF of AGN
- (4) The MF of AGN
- (5) Co-evolution of AGN and their hosts in galaxy formation models (including SMBH growth, AGN

feedback and SB-AGN connection)

(6) The AGN-SB connection - observations

(7) Observational evidences for AGN feedback

(8) AGN and host Metallicity

## 10. Future observations of AGN: 2 lectures