

I. Identitas Calon Promotor

Nama Lengkap : Prof. Dr. Taufiq Hidayat
Fakultas/Sekolah : FMIPA
Kelompok Keahlian : Astronomi
Telp/Fax/E-mail : (022)2511576/(022)2509170/taufiq@as.itb.ac.id

II. Deskripsi Program

Road Map Penelitian yang diusulkan

Judul : Continuum deep-field detection and analysis in sub-mm around radio galaxies: dust and synchrotron emission

The radio galaxies are a type of quasar with a strong radio continuum. The origin of that radio emission was studied in the last decade and the complete picture about the physical processes are still under debate (e.g. Sikora 1997, Merloni & Heinz 2007, Moderski et al. 1998). It has been argued that a type of radio galaxies, namely FR II, are triggered by molecular gas fed towards the center (Buttiglione et al. 2010) when the FR I type are triggered through a “dry” accretion (Bondi accretion) in the Broad Line Region (BLR, see Fromerth & Melia 2001). A key aspect is the ability to feed the accretion disk around the central Supermassive Black Hole (SMBH, see Merloni & Heinz 2008).

It has been suggested that “wet” minor mergers would be a mechanism to bring molecular gas towards the center of the radio galaxies and trigger the radio activity (Lim et al. 2000, Israel 1998). It is then important to study the environment of radio galaxies and the properties of the interstellar medium (ISM) of the neighbor galaxies (Miley & De Breuck 2008). Measuring the molecular gas content in all the satellites would be, by far, too time consuming but the detection of the dust in a deep submm image would give valuable information on the ISM together with the star formation and/or possible activity in the neighbors. It is possible to use only the continuum emission since molecular gas and dust are tightly linked (Omont et al. 1996, Gao & Solomon 2004).

Therefore, we propose to perform an in-depth study in the framework of PhD thesis to use the large amount of data accumulated by ALMA during Cycle 0, 1, 2, and later 3 for the calibrators which are in their vast majority radio galaxies. We will gather the maximum of calibrators and make the deepest image so far in continuum for the ALMA band available at the time of the thesis (likely 3, 6, 7, and possibly 9).

Riset ini merupakan bagian dari program besar mewujudkan Observatorium Astronomi Nasional yang saat ini sedang dalam tahap perencanaan antara ITB bersama LAPAN (mulai 2015). Observatorium Nasional ini juga mencakup pengembangan teleskop radio, bekerjasama dengan beberapa observatorium radio internasional. Kerjasama dengan observatorium multinasional ALMA (Atacama Large Millimeter/submillimeter Array) telah dirintis sejak beberapa tahun yang lalu. Dalam proposal disertasi ini, kami mengangkat topik tentang galaksi radio yang akan memanfaatkan data dari pengamatan ALMA. Mahasiswa akan memperoleh kesempatan magang di ALMA selama tidak kurang dari 1 tahun sehingga akan memberikan pengalaman tambahan yang sangat penting. Pelaksanaan disertasi ini juga merupakan program pembentukan SDM yang mumpuni bagi Observatorium Nasional.