

Activity Report of Commission J October 31, 2016 to March 30

March 30, 2017

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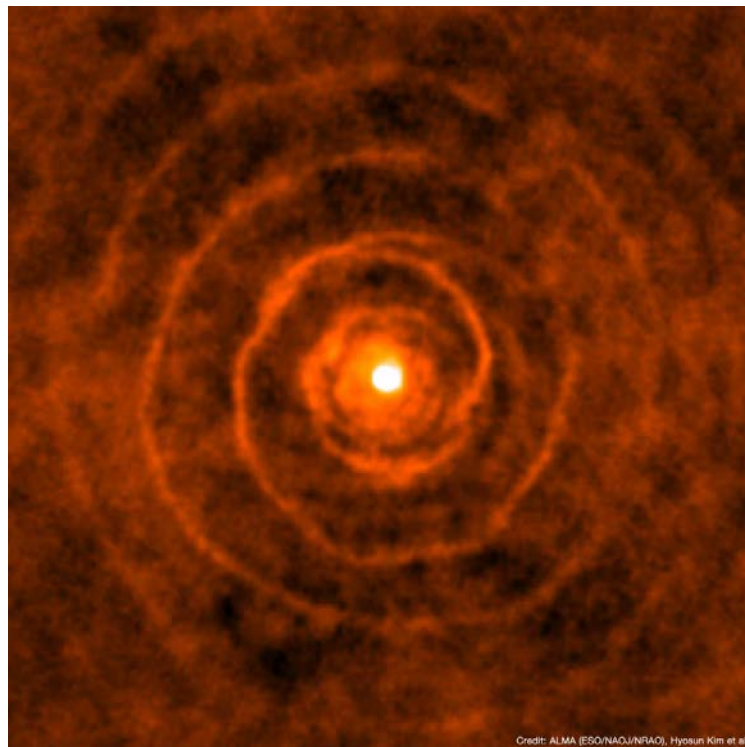
ALMA project

- Latest scientific topics from ALMA press release (Mar 03, 2017)

An Extraordinary Celestial Spiral with a Twist

An international team of astronomers, led by Hyosun Kim in Academia Sinica Institute of Astronomy and Astrophysics (ASIAA, Taiwan), has found a way of deriving the orbital shape of binary stars that have orbital periods too long to be directly measured. This was possible thanks to an observation toward the old star LL Pegasi (also known as AFGL 3068) using the state-of-the-art telescope, the Atacama Large Millimeter/submillimeter Array (ALMA).

The new ALMA images reveal the detailed features of spiral-shell pattern imprinted in the gas material continuously ejected from LL Pegasi. A comparison of this observation with computer simulations led the team, for the first time, to the conclusion that a highly elliptical orbit is responsible for the morphology of gas distribution surrounding this binary system. In particular, the bifurcation of the spiral-shell pattern that is clearly visible in the ALMA image, is a unique characteristic of elliptical binaries. This quintessential object opens a new window on the nature of central binaries through the recurrent patterns that reside far from the star at distances of a few thousand the stellar radii.



(The composite image of molecular gas around an old star LL Pegasi. Credit: ALMA (ESO/NAOJ/NRAO), Hyosun Kim et al.)

Activities of meetings

- **SKA Workshop “Galaxy Evolution and Distant Universe” 2017**

Date: January 7 – 9, 2017

Venue: Arden Hotel Aso, Kumamoto, Japan

Topics: Cosmic Reionization, Cosmology, Galaxy Evolution, and Square Kilometre Array (SKA)

- **ALMA Band 1 Science Workshop**

Date: 16-18 January 2017

Venue: ASIAA, Taipei (Taiwan)

The ALMA Band 1 Science Workshop will take place at the ASIAA (Academia Sinica, Institute for Astronomy and Astrophysics) in Taipei (Taiwan) from January 16 to 18 2017. It will consist of a few invited talks on the main scientific goals of ALMA Band 1, plus contributed talks. We also plan to have poster sessions. The ALMA Band 1 Science workshop will provide the first opportunity to show the exciting new science ALMA Band 1 can deliver and to start preparing for the first observing proposals in the ALMA lowest frequency band. The two days after the workshop, 19-20 January, will be dedicated to the discussion and planning of the upcoming Band 1 Science Verification phase.

- **East-Asian ALMA Science Workshop 2016-Taiwan**

Date: March 10-12, 2017

Venue: National Tsing Hua University, Hsinchu, Taiwan

In the past few cycles of ALMA scientific operations, we see great success from the EA community in producing remarkable results. We are also excited by the expansion of the ALMA community into Korea. To maintain the momentum and to promote regional collaboration, we hold regular science workshops in the three EA-ALMA countries. We are pleased to announce the 2016 East-Asian ALMA Science Workshop, to be held by National Tsing Hua University in Hsinchu, Taiwan, on March 10-12, 2017. Like the previous EA-ALMA Science Workshops, we invite ALMA users to present their recent results. Furthermore, we would like to enhance the workshop functions on promoting discussion and regional collaborations, by adjusting the workshop format. We will split part of the workshop into two parallel sessions on Galactic and extragalactic studies. We will have special sessions for prospective projects to call for collaborators, for archival science, and science that require multi-wavelength observations. The workshop will be timely to develop proposal ideas and form collaborations for the upcoming Cycle-5 deadline for PI programs. On the other hand, we encourage teams that plan to submit large proposals to hold meetings in advance, and present their ideas in the EA ALMA Science Workshop.

- **ALMA/45m/ASTE Users Meeting 2016**

Date: December 19-20, 2016

Venue: NAOJ Mitaka, Japan

The users meeting is hosted by the Chile Observatory and Nobeyama Radio Observatory of the National Astronomical Observatory of Japan (NAOJ).

- **Japan SKA consortium local meeting for “Development” in Kagoshima**

Date: December 17, 2016

Venue: Inamori Hall, Kagoshima University, Kagoshima, Japan

Topics: Technical Development for Square Kilometre Array (SKA)

- **Japan Radio Science Forum Symposium 2016**

Date: February 22 – 23, 2017

Venue: NAOJ, Mitaka, Japan

Topics: Dialogue between Senior and Young Scientists

- **Workshop: Black Hole Astrophysics with VLBI: Past, Present, and Future**

Date: March 27 - 29, 2017

Venue: Mitaka campus of NAOJ, Tokyo, Japan

The workshop "Black Hole Astrophysics with VLBI: Past, Present, and Future", will be held in Tokyo next March. We are organizing this workshop on the occasion of Professor Makoto Inoue's retirement to honor and celebrate his leading and foundational contributions to the field. We aim to share our fond memories of Professor Inoue's scientific career, and we also intend to encourage the younger generation to succeed and exceed the future prospects in the advancing field of radio astronomy. Anybody interested in the workshop is welcome.

- **ALMA Workshop for Proto-Planetary Disks**

Date: January 27, 2017

Venue: Mitaka, NAOJ, Tokyo, Japan

Topics: ALMA proposal Cycle 5, Summary of current works

- **Workshop: 30m THz telescope in Antarctica**

Date: March 2 – 3, 2017

Venue: The National Institute of Polar Research (NIPR), Tachikawa, Japan

Topics: THz astronomy, THz telescope

- **ALMA Workshop “Nearby galaxy M83 2017”**

Date: February 20 – 21, 2017

Venue: Mitaka, NAOJ, Japan

Topics: Observation of fine structure of M83, ISM evolution, Chemical evolution, Star formation

- **Workshop “Why does the Universe accelerate? -Exhaustive study and Challenge for the future”**

Dates: 8 - 10 March 2017

Venue: Kobayashi Hall, KEK, Japan

Because gravity is an attractive force, the expansion speed of the Universe should be decreasing. However, observational data accumulated over the years strongly support that the present Universe is in the phase of the accelerated expansion and there was also another phase of the accelerated expansion in the very early Universe. The physical mechanism that makes the Universe undergo the accelerated expansion is not known yet. Some “repulsive force” is necessary. The purpose of this innovative area is to clarify the origin of the accelerated expansion. In order to achieve this goal, it is necessary to investigate the interplay between the repulsive force causing the accelerated expansion and the attractive force sourced by dark matter which triggers the formation of the cosmic structures such as the galaxies and clusters of galaxies. In this innovative area, researchers from different fields join together and form nine sub-groups: inflation in the early Universe (A01), decelerated expansion by dark matter (A02), accelerated expansion by dark energy in the present Universe (A03), cosmic microwave background (B01), galaxy imaging (B02), galaxy spectroscopy (B03), direct measurement of the cosmic expansion (B04), ultimate data analysis (D01), and ultimate theory of the Universe (C01). Not only collaborations within each individual sub-group but also collaborations among the different sub-groups are essential to obtain scientific achievements we desire.

- **17th “Millimeter/Submillimeter Receiver Workshop” and 3rd “RIKEN and NICT Joint THz Workshop”**

Date: February 27 – 28, 2017

Venue: NICT, Koganei, Japan

Topics: Detection Devices, Optics, Antenna, HEMT, Cooling, Integration, Calibration and Science, Future Projects

- **ALMA Workshop for Solar System**

Date: March 6, 2017

Venue: Mitaka, NAOJ, Japan

Topics: Millimeter and Submillimeter observation and Solar System

- **ALMA Workshop on Stars : At the Age of Full Band Availability**

Date: March 24 – 25, 2017

Venue: Okayama University of Science, Okayama, Japan

Topics: Evolved Stars, Molecule/Dust, Full-band observation