MILLENNIUM NUCLEUS OF NATURAL SCIENCES

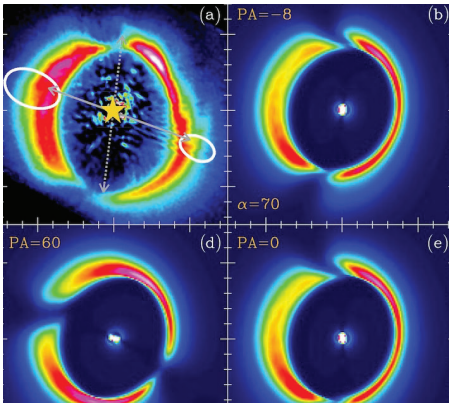
MILLENNIUM NUCLEUS CENTER OF PROTOPLANETARY DISKS IN ALMA EARLY SCIENCE- **MAD**

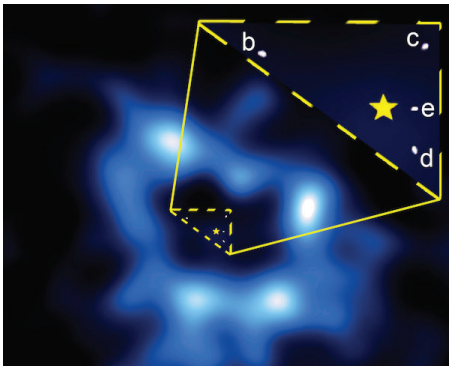
Area of Impact: Astronomy
Specialty: Astrophysics

The Millennium Nucleus Center of Protoplanetary Disks is a place dedicated to research on planet formation, mainly using the ALMA Observatory.

The team of this Millennium Nucleus Center has established as goals to observe ongoing planet formation and to understand how a progenitor disk evolves towards the state of a mature planetary system.

In its first four years of operations, MAD has maintained an ISI publication rate of 20 articles per year. It has produced 6 press releases and 3 high-impact papers in Nature and Science.





MAIN ACHIEVEMENTS

- The discovery of flows of gas crossing a protoplanetary cavity. The kinematics of the flow allowed us to understand the growth rate of the star, and demonstrate that the disks where planets are born can have variable inclination, that is to say they are not restricted to a single plane, which is not the case with the Solar System.
- The identification of 'dust traps' where grains are growing in rocks and eventually in planetesimals.
- A first observation of the snow line in a protoplanetary disk. Once across the radius of the snow line, in direction towards the star, a reduction in dust grain size and an increase in their numbers were observed. These are important elements to understand the growth of grains in planetesimals.

CONTACT INFORMATION

DIRECTOR: **Simón Cassasus**

ACTING DIRECTOR: **Lucas Cieza**


Simón Cassasus


Lucas Cieza

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MAD

MILLENNIUM NUCLEUS
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RESEARCHERS

Principal Researcher:
Simón Casassus

Acting Principal Researcher:
Lucas Cieza

Associate Researchers:
Jorge Cuadra
Matthias Schreiber

Junior Researchers:
Sebastián Pérez
Gerrit van der Plas
Henning Avenhaus
Matías Montesinos
Pablo Román
Gesa Bertrang
Alice Zurlo
Dave Principe
Johan Olofsson
Claudio Cáceres
Nicolás Cuello
Aiara Gomes

RESEARCH TOPICS

- **Planetary accretion and studies of protoplanetary disks at high resolution.**
- **High-contrast images and direct detection of young giant planets.**
- **The evolution of gas and dust in disks.**
- **Debris disks and interaction of young planets with remaining disks.**

NOTED OUTREACH ACTIVITIES

- **Planetary Log – Cazadores de Eclipses (Eclipse Hunters):** a novel for children with astronomy content.
- **Experiential Education:** complementary material for schoolteachers including interactive activities.
- **Artistic Expression Workshops in schools** to spark scientific curiosity related to astronomy (2016).

PRODUCTIVITY PUBLICATIONS (2010-2015)

ISI: 200

ACTIVE MILLENNIUM NUCLEUS CENTER

From 12/24/2014 to 12/24/2017
Previously from 2010 to 2013

The Millennium Nucleus Centers can be renewed after 3 years, reaching a maximum of 6 years.

PRESENCE

METROPOLITANA REGION
AYSÉN DEL GENERAL CARLOS IBÁÑEZ DEL CAMPO REGION

HOST INSTITUTIONS:

Universidad de Chile
Pontificia Universidad Católica de Chile
Universidad de Valparaíso Chile
udp Universidad Diego Portales