

ESTADO FINAL RESOLUCION DEL CONSEJO Observaciones: _____ _____	FECHA <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; width: 30px; height: 30px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px;"></div> </div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <input style="width: 50px; height: 20px;" type="text"/> </div> <div style="font-size: small;"> 1. APROBADO 2. PENDIENTE 3. RECHAZADO 4. A FISCALIA </div>
--	--	---


This is only for internal use of FONDAP

EVALUATION REPORT CENTERS FOR ADVANCED RESEARCH

I. PROJECT INFORMATION

CENTER'S NAME CENTRO DE ASTROFISICA
DIRECTOR GUIDO GARAY

II. EVALUATION PANEL

NAME	ORGANIZATION/ INSTITUTION	E-MAIL	SIGNATURE
Mitchell Begelman	University of Colorado at Boulder, Colorado, USA	mitch@jila.colorado. edu	

III. PROGRAMS EVALUATION (please fill up as many forms as programs exist within the Center)

PROGRAM'S NAME

Birth and evolution of structures in the universe

PRINCIPAL INVESTIGATOR

Leopoldo Infante

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	X			
Quantity of the results reached regarding the objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration with other ongoing programs of the Center	X			
Diffusion of the results	X			

PROGRAM'S NAME

Stellar populations in the local universe

PRINCIPAL INVESTIGATOR

Doug Geisler

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	X			
Quantity of reached outcomes related to proposal objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration with other ongoing programs of the Center	X			
Diffusion of the results	X			

* If there had been none, please disregard this question

PROGRAM'S NAME The extragalactic distance scale
PRINCIPAL INVESTIGATOR Wolfgang Gieren

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	X			
Quantity of the results reached regarding the objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration with other ongoing programs of the Center	X			
Diffusion of the results	X			

PROGRAM'S NAME Star formation				
PRINCIPAL INVESTIGATOR Guido Garay				
ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	X			
Quantity of reached outcomes related to proposal objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration with other ongoing programs of the Center	X			
Diffusion of the results	X			

* If there had been none, please disregard this question

PROGRAM'S NAME Low mass stars and planets
PRINCIPAL INVESTIGATOR Dante Minniti

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	X			
Quantity of the results reached regarding the objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration with other ongoing programs of the Center	X			
Diffusion of the results	X			

PROGRAM'S NAME Supernovae and dark energy
PRINCIPAL INVESTIGATOR José Maza

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	X			
Quantity of reached outcomes related to proposal objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration with other ongoing programs of the Center	X			
Diffusion of the results	X			

* If there had been none, please disregard this question

IV. CENTER EVALUATION

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Uso Interno
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the Center	X			
Quantity of reached outcomes related to proposal objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration between the programs of the Center	X			
Creation and reinforcement of international networks		X		
Outreach		X		
Diffusion of results	X			
Establishment and tasks of the Advisory Committee	X			

RECOMMENDATIONS (see following concepts)					
<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">X</div>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div>	<div style="background-color: #00FFFF; width: 40px; height: 40px; margin: 0 auto;"></div>
APPROVE	APPROVAL WITH SUGGESTIONS	ADDITIONAL INFO.	PENDING	REJECT	FONDECYT USE
<div style="border: 1px solid black; display: inline-block; padding: 5px;"> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">25</div> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">04</div> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">09</div> </div>					
Evaluation Date			Signature reviewer		

EVALUATION CONCEPTS ANNUAL REPORT

1. **Approve:** The reviewer recommends to accept the report in its present form since he/she considers objectives and goals fully accomplished and all relevant issues covered by the report.
2. **Approval with suggestions or minor observations**
 - 2.1 **Minor observations:** The reviewer recommends the approval of the report despite the justified incompleteness of some aspects that does not constitute an obstacle for the continuity of the Center activities.
 - 2.2 **Suggestions:** The reviewer recommends minor changes in order to improve the future performance of the Center.
3. **Additional information:** The reviewer requires additional documentation or specific explanations to fully evaluate the report.
4. **Pending:** The reviewer makes significant observations to the report and conditions its approval to the accomplishment of specific demands.
5. **Reject:** The reviewer has strong objections to the contents of the report.

EVALUATION COMMENTS:

The research activities in all 6 areas are very impressive, particularly in the level (quality and quantity) of research productivity (as measured by refereed publications), and student and postdoctoral involvement in research projects. The Center appears to have achieved its principal aim of enhancing infrastructure and human resources in astrophysics across the country. The programs appear to be very well integrated, and targeted effectively at the main national strengths: ground-based optical and IR astronomy, and the advent of ALMA.

[While it is appropriate to emphasize observational research, especially initially, in looking to the future the center might try to balance these activities with more theoretical and computational research. This might help to draw in those students and postdocs whose interests tend in these directions.

Given the current size and scope of the center, the international visitor's program could be expanded considerably. This would give the center much greater international visibility, and also increase opportunities for students and postdocs to interact with leading researchers from abroad. One way to do this might be to organize thematic programs of 2-3 weeks or more, to which a number of visitors would be invited simultaneously (along the lines of those at NORDITA in Stockholm, INAOE in Puebla, the new Kavli Institute in Beijing, and other centers, though not necessarily on the same scale). Organizing international conferences and workshops is another good way to enhance international visibility. (None were organized during the period of this annual report; I do not have information about previous years.)

The center does not report a very strong media presence in Chile (e.g., through stories in newspapers, magazines, radio, TV, and popular internet sites). More effort could be made to increase national exposure through the media outlets that are available.

ESTADO FINAL RESOLUCION DEL CONSEJO Observaciones: _____ _____	FECHA <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; width: 30px; height: 30px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px;"></div> </div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <input style="width: 40px; height: 20px;" type="text"/> </div> <div style="text-align: left;"> 1. APROBADO 2. PENDIENTE 3. RECHAZADO 4. A FISCALIA </div>
---	--	---

This is only for internal use of FONDAP

EVALUATION REPORT CENTERS FOR ADVANCED RESEARCH

I. PROJECT INFORMATION

CENTER'S NAME Center for Astrophysics
DIRECTOR Guido Garay

II. EVALUATION PANEL

NAME	ORGANIZATION/ INSTITUTION	E-MAIL	SIGNATURE
Professor Ronald Snell	University of Massachusetts	snell@astro.umass.e du	

III. PROGRAMS EVALUATION (please fill up as many forms as programs exist within the Center)

PROGRAM'S NAME: Birth and Evolution of Structures in the Universe

PRINCIPAL INVESTIGATOR: Leopoldo Infante

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	X			
Quantity of the results reached regarding the objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration with other ongoing programs of the Center		X		
Diffusion of the results	X			

Comments: This has been a very successful area of research for the Center that has brought together researchers from Universidad de Chile and Pontificia Universidad Católica. The original MUSYC key project, and the follow up studies to it, have made important contributions to this field. Researchers in this area have been very productive and have produced a large number of publications over the past year. This research area has provided Chilean astronomy worldwide visibility in cosmological studies. The addition of a theory component to this area is a good direction, and will be beneficial in the interpretation of the observational data. There was mention of extending the studies of LSBs to mm and sub-mm wavelengths, it would be interesting to hear more about these observations and how these observations will connect with ALMA in the future.

PROGRAM'S NAME: Stellar Populations in the Local Universe

PRINCIPAL INVESTIGATOR: Doug Geisler

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	X			
Quantity of reached outcomes related to proposal objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration with other ongoing programs of the Center		X		
Diffusion of the results	X			

- If there had been none, please disregard this question

Comments: This program area brings together researchers from all three Chilean institutions that are part of the Center. The three broad topics being studied are all extremely interesting and provide information on dynamics and stellar populations that is useful in understanding the formation of the Milky Way and other galaxies. I find of particular interest the use of globular clusters in the Milky Way and M31 to trace the dynamics of these galaxies, measurements of the metallicity gradients in galaxies beyond the Local Group, and the study of multiple populations in Milky Way globular clusters. This has also been a very productive area and over 30 publications in refereed journals over the past year.

PROGRAM'S NAME: The Extragalactic Distance Scale

PRINCIPAL INVESTIGATOR: Wolfgang Gieren				
ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	X			
Quantity of reached outcomes related to proposal objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration with other ongoing programs of the Center		X		
Diffusion of the results	X			

Comments: This research area brings together researchers from the Universidad de Concepción and the Pontificia Universidad Católica. The Araucaria Project has been very successful key project and has led to distance estimates for a number of nearby galaxies. The group has also played an important role in calibrating the various distance estimators such as blue supergiants, the infrared PLZ relation for RR Lyrae stars, eclipsing binaries and the infrared surface brightness method for Cepheids. The use of many independent distance estimations are important to provide precision distances and remove dependency on effects such as metallicity. The publication of several papers reporting distances by different methods has capitalized on their early work.

PROGRAM'S NAME: Star Formation				
PRINCIPAL INVESTIGATOR: Guido Garay				
ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	X			
Quantity of reached outcomes related to proposal objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration with other ongoing programs of the Center		X		
Diffusion of the results	X			

Comments: This fourth program area is led entirely by researchers at Universidad de Chile. The group has a number of papers published and projects underway to study low and high mass star formation using the mm and sub-mm facilities (APEX, ASTE, and NANTEN) in Chile. The group is involved with the large ATLASGAL key project using APEX/LOBOCA to survey the inner Galaxy for sites of high mass star formation. I think this survey is exciting and will provide a large sample of sources to address massive star formation in the Milky Way. Follow-up observations will be very important. It is mentioned that similar surveys are planned for Herschel and NANTEN2, what are these ? Although the projects mentioned are very interesting and the group has been productive, it would be useful to get a sense of how these projects fit together and what is the future direction for their research. As I mentioned before, I think there is much potential to consider a key ALMA project built around the the study of star formation, and it could be based on the results of ATLASGAL or maybe on the AeBe survey. It would be good for this group to begin to think about and develop ALMA projects, including key projects. The researchers are also developing a molecular line radiative transfer code, and this will be very valuable for interpreting the spectral line results from the various mm and sub-mm instruments, including ALMA.

PROGRAM'S NAME: Low Mass Stars and Planets				
PRINCIPAL INVESTIGATOR: Dante Minniti				
ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	X			
Quantity of reached outcomes related to proposal objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration with other ongoing programs of the Center		X		
Diffusion of the results	X			

Comments: This research area has participation from all three Center institutions. This group is participating in the ESO Large Programme 666 to obtain the mass-radius relation for transiting exoplanets, brown dwarfs and M dwarfs. This program has been very successful. This group is also participating in the N2K Doppler planet search and the future HAT-South project, the latter capable of the discoveries of a significant number of transiting extrasolar planets. In addition, the group was approved for a Phase A study of a new spectrograph concept for the ESO ELT. The group has been productive and appears to be moving in a good direction.

PROGRAM'S NAME: Supernovae and Dark Energy				
PRINCIPAL INVESTIGATOR: José Maza				
ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	X			
Quantity of reached outcomes related to proposal objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration with other ongoing programs of the Center		X		
Diffusion of the results	X			

Comments: This new research area includes researchers from the Universidad de Chile and the Pontificia Universidad Católica. The group is involved in both supernovae searches and the follow-up photometry and spectroscopy. Using this nearby sample of supernovae, the group has worked to improve the techniques for calibrating supernovae for accurate distance determinations. In addition this group is also studying the detailed physics of supernovae. This area shows great promise and has already produced a number of published results. It is not clear how much overlap there is with the research in Area 3.

IV. CENTER EVALUATION

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Uso Interno
Degree of adoption of suggestions from the last report *	X			
Accomplishment of objectives and goals of the Center	X			
Quantity of reached outcomes related to proposal objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration between the programs of the Center		X		
Creation and reinforcement of international networks	X			
Outreach		X		
Diffusion of results	X			
Establishment and tasks of the Advisory Committee		X		

RECOMMENDATIONS (see following concepts)					
<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">XXX</div>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; background-color: #e0ffff;"></div>
APPROVE	APPROVAL WITH	ADDITIONAL INFO.	PENDING	REJECT	
<div style="display: flex; justify-content: space-between;"> <div>FONDECYT USE</div> <div>SUGGESTIONS</div> <div style="border: 1px solid black; width: 100px; height: 20px; margin-left: 10px;"></div> </div>					
Evaluation Date			Signature reviewer		

EVALUATION CONCEPTS ANNUAL REPORT

1. **Approve:** The reviewer recommends to accept the report in its present form since he/she considers objectives and goals fully accomplished and all relevant issues covered by the report.
2. **Approval with suggestions or minor observations**
 - 2.1 **Minor observations:** The reviewer recommends the approval of the report despite the justified incompleteness of some aspects that does not constitute an obstacle for the continuity of the Center activities.
 - 2.2 **Suggestions:** The reviewer recommends minor changes in order to improve the future performance of the Center.
3. **Additional information:** The reviewer requires additional documentation or specific explanations to fully evaluate the report.
4. **Pending:** The reviewer makes significant observations to the report and conditions its approval to the accomplishment of specific demands.
5. **Reject:** The reviewer has strong objections to the contents of the report.

EVALUATION COMMENTS:

I was very pleased to see information provided on the response of the Center to suggestions from previous evaluations. This is very valuable information for the outside reviewers.

The Center for Astrophysics has completed another very successful and productive year in research and student training. The Center continues to produce substantial and important publications in the world's leading astronomical journals. The 113 publications this year is a significant accomplishment. The key projects and the various research areas have been an important part of this success and important in building collaborative science between the three institutions that are part of the Center.

The Center has continued to play an important role in developing human resources in Chile. The number of researchers that are part of the Center has steadily grown, surpassing goals set at its outset. Even more impressive gains have been made in student training. Chile now has three institutions with active graduate training in astronomy and the number of students has increased enormously under the Center. International collaborations continue to expand. The exchange program set up with UNAM, Morelia is a great way to expand the radio astronomy expertise in the Center and to share the training of graduate students and postdoctoral fellows. It is hoped that the collaboration with the European institutions will be funded.

I was very pleased to read the plans concerning the technology initiative. I believe that the directions selected are extremely well motivated. Building the ALMA Band 1 receiver cartridges, will not only expand the frequency coverage and capabilities of ALMA, but will be a great opportunity for student training in both astronomy and electrical engineering in Chile. Band 1 is at relatively low frequency, and thus has direct applications to commercial communications. I believe that the experience learned from this development will contribute to the technological advancements in Chile. High performance computing has become an essential element of many sciences, even the life sciences where substantial computing power is needed for studies in genomics. In astronomy, the massive datasets that are now being acquired will need substantial computing power for analysis and will need large digital storage capabilities. In addition, much theoretical work is now based on numerical simulations that requires high performance computing facilities. I think this is an important direction for the Center to move and has potential for synergy with other sciences and in the development of computational infrastructure in Chile. I am very pleased to see the CONICYT has approved funds for CATA to develop these technological areas.

The importance of an external Advisory Committee cannot be overstated. I am glad to see that the Center has put together a committee of very distinguished astronomers that represent a broad range of astronomical interests. The report mentions that the committee has provided a document with a critical view of the Center with recommendations. It would be useful in future reports to be given the list of recommendations and told how the Center plans to respond to these recommendations.

I have commented in the past about the need to prepare for ALMA. I was happy to read that the Center has developed a plan to prepare themselves for the ALMA-era. The two schools mentioned are excellent means to train the next generation of Chilean astronomers in the techniques of aperture synthesis. In addition, sending students to Caltech, Harvard, Illinois and Texas is an ideal way for the students to acquire direct training on existing mm and sub-mm interferometers and upon their return to Chile help lead efforts using ALMA.

Another comment I have made in the past is the lack of student authorship on publications. I stressed how important it is to encourage student participation in research early in their graduate training. I am happy to see that the increase in student authorship this year. In fact, the number have increased steadily since the first year of the Center. Although I greatly applaud the Center for the increase, I think they should strive for even more student participation in publications of the Center. Currently, only 22 of the 113 publications have graduate student participation. Hopefully, in future we will see the participation continue to rise.

I have a few suggestions for the future. First, I think now is the time to consider additional key projects, especially those for ALMA. The four key projects have been extremely successful in bringing together Chilean astronomers, in building collaborations with European and US astronomers and in making more effective use of the observing resources available in Chile. I think the next round of key projects for the next decade of the Center should now begin to be discussed. Meeting of the Center members over the coming years could develop these plans and build stronger connections between the various research areas and Center members. I also think with ALMA only years away, some of these key projects should be centered on ALMA science.

Another suggestion concerns the Center's Website. Although the web pages developed for children and the general public are interesting and informative, much of the rest of the website is unchanged. Under events, the most recent is in 2007. I hope that the Center has had mini-courses, seminars, workshops or research meetings since that posting. A current website is important to make all aware (and most importantly the students) of the Center's activities. I again strongly suggest that the website be maintained and have both a Spanish and English version to advertise the Center activities in the international astronomical community.

I have one question regarding the organizational chart. The chart shows a Research Committee and a Graduate Studies Committee, do these committees meet, and how often? It would be useful to include a report of these committees in each year's annual report.

Overall, I was very pleased to see the advances in so many areas of the Center over the past year. I strongly believe that the Center for Astrophysics is a force in transforming Chilean Astronomy. The Center has been extremely successful in increasing the number of researchers and in educating and training the next generation of Chilean astronomers. I believe the technology endeavors will both enhance the Center and the general technological development of Chile.