

COMMISSION F2

EXOPLANETS AND THE SOLAR SYSTEM

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TRIENNIAL REPORT 2018–2021

1. Activities of IAU Commission F2 during 2018-2021

The Commission C.F2 “Exoplanets and the Solar System” resulted from the merging of the previous commissions C16 (*Physical study of planets and satellites*) and C53 (*Extrasolar planets*). Although extrasolar planets are detected and observed with different instruments and different techniques than the planets of the Solar System, the physical properties of these objects have many aspects in common. The Commission promotes exchange and interaction between the two communities.

In summary, the scientific activities and areas of expertise of the Commission members include:

- The search and characterization of exoplanets and their satellites,
- The investigation of Solar System planets and their satellites,
- The observations and modeling related to the origin of the planets and planetary systems,
- The modeling of planetary atmospheres, surfaces and interiors,
- The study of planetary dynamics,
- The laboratory work directly in support of such observational and theoretical investigations.

Commission F2 currently has 421 members.

Based on the positive evaluation of the Commission’s application for continuation by the IAU Executive Committee, Commission F2 Exoplanets and the Solar System will continue its effort during the upcoming term 2021-2024.

2. Activity

2.1. *Development of proposal for IAU WG Exoplanetary System Nomenclature*

Exoplanetary science is a relatively new field of study, with the first announced discoveries of bona fide exoplanets having occurred only 30 years ago. As with much of astronomy, naming conventions have been developed ad hoc. Multiple star systems name individual members based on the name given when only one of the objects was known,

with Roman letters beginning with A and proceeding alphabetically in order of discovery or decreasing brightness; lower case letters, beginning with ‘b’ are used for companions to single-lined spectroscopic binaries. As most of the early exoplanet discoveries were made using stellar spectroscopy, this convention has been used for exoplanet designations. Thus, as with many classes of astronomical objects, exoplanet names are often arcane and non-descriptive.

Exoplanets have attracted considerable attention, and the public has wanted popular names for some of their favored planets. The IAU has responded with two public naming campaigns, organized by the WG Exoplanets for the Public. Both campaigns were well-received by the public, but the exoplanet scientists in general have not adopted public names in the research literature. In 2020, leaders of Commission C.F2 and Division F proposed to dissolve the WG Exoplanets for the Public and replace it with a more broadly chartered Functional WG Exoplanetary System Nomenclature. That proposal is under consideration, and the new WG would be under Division F; see Division F’s triennial report for details.

2.2. *IAU symposia and focused discussions*

The Organizing Committee of Commission C.F2 assessed proposals requesting the support of the C.F2 for IAU symposia and focused discussions. Most of the proposals submitted for the support have been considered to be of high quality and in agreement with the objectives of the commission, and therefore were endorsed. Some of the approved meetings have already taken place. Others have been delayed because of the global pandemic.

2.3. *Consultation of the Commission Membership on Exoplanet Definition and Related Issues*

The Organizing Committee of C.F2 decided to hold a plebiscite asking all commission members issue to vote on four issues related to the nomenclature, the definition of an exoplanet, and the credits of discoveries. The consultation questionnaire was sent to all members of the commission during the summer of 2018.

The four questions were as follows:

- Should the term “planets” only apply to objects that have a mass ratio to the central object below the L4/L5 instability limit ($M/M_{\text{central}} < 2/(25 + \sqrt{621}) \approx 1/25$). Do you endorse this additional criterion for being called a planet?
- In the WGESp definition, to be considered to be a “planet”, the object needs to orbit a star or a stellar remnant. The OC proposes to extend the criterion for the central object to include also the “brown dwarfs”. Do you endorse this extension of the central object criterion?
- A list of guidelines and recommendations is proposed for the exoplanet nomenclature. They can be found in the Consultation rationale. Do you endorse these guidelines and recommendations for the exoplanet nomenclature?
- The OC has placed super-majority requirements for the passage of Questions 1 - 3. Should a two-thirds super-majority of both members of the OC expressing opinions and members of the commission expressing opinions be required for future changes in the definition of an exoplanet, planetary nomenclature, and discovery criteria?

Members could vote ‘Yes’, ‘No’ or ‘No opinion’ on each of the four questions.

All four questions received support from more than 70% of members who expressed an opinion, and thus all four were adopted. The results of this wide consultation were

presented at the General Assembly in Vienna.

Jack Lissauer
President of the Commission