

Observational Astrophysics

17. Practical exercise: preparation and evaluation of observing proposals

Rodolfo Smiljanic
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Nicolaus Copernicus Astronomical Center
Polish Academy of Sciences
ul. Bartycka 18
00-716 Warsaw, PL

E-mail: rsmiljanic@camk.edu.pl

Office: 115

<http://users.camk.edu.pl/rsmiljanic>

1 Transient source discovery

A new gravitational wave signal GW211207 was detected on 07 December 2021, 07:15:15 UT. A short duration gamma-ray burst was detected in the gravitational wave error region about 1 second later by both Fermi and INTEGRAL.

Source classification indicates >99% probability of a binary neutron-star merger (<1% terrestrial).

A scan of the sky region where the event was detected using the 60cm Rapid Eye Mount (REM) telescope, at the La Silla Observatory, was lucky to provide one quick detection of a new point-like optical source, just before twilight forced the observations to end.

Coordinates of the new source are: right ascension (ICRS, J2000) = 04h 52min 57.29s, declination (ICRS, J2000) = $-25^{\circ} 14' 8.30''$.

The source is located about 70 arcsec from the center of the barred spiral galaxy ESO 485-21, at the edge of one of its spiral arms. The galaxy has $z = 0.0046$ and is at about 20 Mpc from Earth.

Measured AB-magnitudes of the point source in the Sloan/SDSS filters were:

- $g = 15.70$ mag, $r = 15.65$ mag, $i = 15.40$ mag, $z = 15.30$ mag,

at MJD = 59555.35.

2 Deadline

Deadline to deliver the proposal is **January 14, 2022 by 14:00:00 CET**. Please, send a pdf of the proposal by e-mail. The time of arrival of your e-mail should be before 14:00:00 CET for the submission to be considered valid.

Immediately after the deadline, I will assign and distribute the proposals to the referees. See additional information below.

3 Instructions for writing

Your task is to write one observing proposal motivated by the discovery of this new transient source.

The proposal should make use of instruments mounted at ESO telescopes at the Cerro Paranal and/or La Silla observatories (but not at Chajnantor, as we did not discuss sub-mm observations). You are free to choose any instrument that has been offered for the P109 cycle (see <https://www.eso.org/sci/observing/phase1/p109/CfP109.pdf>). Your proposal can make use of more than one instrument, if that is what is needed to achieve your science goal. We discussed so far only photometry and spectroscopy (optical and IR), but if you want to try something different (interferometry, polarimetry), feel free.

The science case has to be motivated by the transient source, but does not necessarily need to involve observing that source. Perhaps there is an interesting question related to the environment where the source appeared that you would like to address?

For the purposes of this exercise, you can consider that observing the source already at the night of 07 December 2021 would be possible. You can write your proposal assuming a (non-existing) fast track channel that would evaluate your proposal on the same day. Alternatively, you can assume that you wrote a target of opportunity proposal in advance, and will activate the observations after receiving the alert. Or you can follow-up the source at any other time.

A few tips: 1) Read the call for proposals; 2) Read the manual of your chosen instrument for tips on how to prepare observations; 3) when preparing the technical justification of your observations, do consider that the brightness of the transient source is not constant, but will be fading at some rate; 4) if you are interested in measurements in physical units (flux calibration), do check the calibration plan of your chosen instrument. Do you need to request time to observe standards? Or will the observatory do it for you?

4 Proposal template

Nowadays, to submit a proposal to ESO, you use an on-line form inside the “P1” submission system. It is a much easier way to prepare a proposal.

However, I will ask you to not use that. This is just to avoid the accident where you submit our proposal exercise by mistake.

Instead, I am providing the old ESO proposal LaTeX [template here](#). Please, use this template to prepare your proposal. Do note that the template might have problems with instruments that were not available at that time (e.g., CRIRES). If you run into troubles when choosing the instrument, do let me know and I can try to help in finding a solution.

5 Proposal evaluation

The procedure for the proposal evaluation will closely follow what is done for the evaluation of ESO proposals:

1. Each student that submits a proposal will be assigned to referee three proposals.
2. For one proposal, you will be the **primary** referee. For the other two proposals, you will be one of two **secondary** referees.
3. Primary and secondary referees are the only ones that pre-evaluate the proposals.
4. Everybody will get access to all proposals. Even though you are not pre-evaluating all proposals, on a real panel you are requested to read all proposals so that you can have an opinion about them for the discussion.
5. You will need to provide the pre-grades and the comments about the three proposals assigned to you by **January 28, 2022 at 14:00:00 CET**. Please, keep the deadline or there will be problems to organize the panel discussion.
6. When you are evaluating ESO proposals, you are assigned to a panel in one of four different categories¹. The categories are, however, general enough that you end up evaluating many proposals outside your area of expertise². This division in panels and categories is made because ESO receives about 1000 proposals every semester. In other smaller observatories, it might be that only ~ 50 proposals are received per semester. In many such cases, there will be only one time allocation committee (TAC) with 5-10 people that will need to evaluate all proposals, in all areas of astrophysics.
7. This is the grade scale that you should use. It is the same used by the panels evaluating ESO proposals:
 - 1.0 outstanding: breakthrough science
 - 1.5 excellent: definitely above average
 - 2.0 very good: no significant weaknesses
 - 2.5 good: minor deficiencies do not detract from strong scientific case
 - 3.0 fair: good scientific case, but with definite weaknesses
 - 3.5 rather weak: limited science return prospects
 - 4.0 weak: little scientific value and/or questionable scientific strategy
 - 4.5 very weak: deficiencies outweigh strengths
 - 5.0 unsuitable
8. The full grade scale to the first decimal digit can and should be used. You can assign grades 2.1, 2.7, 1.8, etc. This actually helps in the ranking of the proposals.

¹<https://www.eso.org/sci/observing/phase1/p109/opc-categories.html>

²I have participated as member of panel D, on stellar evolution. It does include proposals on every type of stellar object, of any mass, in any evolutionary stage. From young pre-main sequence stars with disks, to AGBs losing mass, to white dwarfs, black hole candidates, neutron stars, etc...

9. Some proposals can have multiple runs. **Grades are given for each run separately.** So yes, it can happen that only part of your proposal with multiple runs is approved.
10. There are three criteria that one is asked to keep in mind when grading ESO proposals, in order of importance:
 - (a) scientific merit of the proposal and the contribution that the project will give to the advancement of scientific knowledge;
 - (b) the evidence that was provided by the proposers of sufficient resources and an adequate analysis strategy to complete the project in a timely manner;
 - (c) the scientific outcome of previous observations of the team using ESO telescopes (i.e., if you are timely publishing the data that you are acquiring).
11. Proposals should be evaluated based solely on their contents. One should not be trying to guess what the authors really want.
12. When evaluating ESO proposals, one is instructed to consider the following questions:
 - Does the proposal present sufficient background/context of the science question for the non-expert in that field?
 - Does the proposal clearly present the previous results published in the literature?
 - Are the proposed observations and the objectives of the project pertinent in the context of the background information that was provided?
 - Is the sample selection clearly described? If this proposal contains a single target, is the choice justified?
 - Are the selected instrument modes clearly specified and justified?
 - Will the proposed observations add significantly to the knowledge of this particular field?
13. The comments provided by the primary and secondary referees should be concise but informative. Strengths and weaknesses should be emphasized. Try to provide comments that are sensible and meaningful. Be careful with the language employed. Avoid comments that may be perceived as derogatory or insulting.
14. A good template to follow in your comments is to include: 1) a few sentences with a small summary of what is proposed; 2) a short comment about the timeliness (how important is the science topic in the current context of the field); 3) comments about the proposal strengths; and 4) comments about the proposals weaknesses.
15. One fake example of how such comments might look like: “Summary: This proposal requests time series spectroscopy with FORS2 of a recently discovered peculiar star in the Galactic bulge. The object was recently identified in the OGLE photometric database. It shows variability consistent with that of two giant stars, possibly in contact and close to merging with each other. Timeliness: Stellar mergers, of any kind, are poorly understood but happen in several stages of stellar evolution. Following up one such merger before it happens can have impact in several different areas where understanding binary evolution is important (e.g. red novae, SNe Ia, neutron star mergers). Strengths: Real time observations of the merging of two stars would be a remarkable achievement. This is breakthrough science capable of producing unique data that has little chance of ever being obtained again in the foreseeable future. Weaknesses: The requested cadence of observations is not well justified. It is not clear what

is the physics that needs to be followed in such short cadence. The signal to noise requested seems insufficient to measure the lines that can disentangle the two proposed configurations for the system.”

16. Once I receive all the grades and comments, I will prepare the material that is distributed before the panel meeting. The material will include the ranking list of all proposals, the grades and comments of all the referees.

6 Panel meeting

Our panel meeting will take place on **February 8, 2022**.

1. It will be easier to do the panel meeting fully on-line.
2. To make the panel shorter, we will make a pre-panel triage. A similar triage procedure is made for ESO proposals. The lowest-ranked $\sim 30\%$ of the proposals will not be discussed at the panel meeting. This will be necessary to try to keep our meeting within 1h30min. ESO also does a triage of the proposals, also at $\sim 30\%$, but the ranking they use is per telescope and takes into account the requested time. We will not be so sophisticated.
3. Triaged proposals are not discussed. Their final grade is the one assigned by the primary and secondary referees in the pre-evaluation.
4. I will chair the meeting and try to keep the pace (~ 5 mins per proposal).
5. When it is time to discuss your proposal, I will ask you to leave the room. (or send you to the waiting room in Zoom).
6. We will review all proposals that were not triaged and assign grades to them. First, the primary will be asked to present the proposal and give their assessment. Then, the secondary referees and all other panel members can give their comments. We can have a general discussion and then we have the final voting. This time, every panel member votes on every proposal that is under discussion.
7. Voting is secret. I will investigate the best way to do that (either by Zoom, chat, email).
8. We will take the mean grade as the final grade that is used to prepare the proposal ranking.
9. Ranking information will be sent by e-mail, to each proposer. You will not know the final grade of your proposal, but you will know in which quartile of the ranking your proposal was evaluated.