Individual Development Plan (IDP) and Performance Review

Adapted from "Lab Dynamics: Management and Leadership Skills for Scientists by Cohen & Cohen
The student should complete the form every 6-12 months and request advisor comments.

Student Name: Md Mahmudul Hasan Anik
Advisor name: Andrew W. Steiner
Date of this review: June 15, 2023

The goal of this form is to enable a conversation between students and advisors to enable both to optimally reach their mutual goals.

Section A. Review of past period (if applicable)

To be completed by student

1. List the goals from the previous period and their status

Goal 1. Complete current project - finish data collection and analyze results Check one:	___ Completed	_X_ In progress	___ Not started
Goal 2. Start writing the first-author paper Check one:	___ Completed	_X_ In progress	___ Not started
Goal 3. Take the comprehensive exam Check one:	___ Completed	_X_ In progress	___ Not started
Goal 4. Check one:	___ Completed	___ In progress	___ Not started
Goal 5. Check one:	___ Completed	___ In progress	___ Not started

2. Advising. Describe your interactions with your advisor. Are you getting enough time with your advisor? How frequently do you meet? How could your advising experience be improved?

   I get enough time with my advisor. We meet twice a week - once as a group and once individually. We also communicate in Slack outside these meeting hours. I find my advisor responsive when contacted.

3. Skills. Describe what new scientific skills or techniques you learned during this review period.

   The graduate-level courses taught me many useful concepts that have direct applications in my research. For example, I learned about different computational techniques, machine learning, and neural networks. In nuclear physics, I learned more about the equation of state of dense matter and how perturbative QCD constraints the EoS at higher densities. Moreover, I also learned about chiral EFT and many body perturbation theory, and how contributions from two- and three-body interactions can effectively constrain the EoS at low energies. Finally, I learned about stellar evolution, general relativity, and cosmology. These concepts are crucial to my work.

4. Describe any unusual or unanticipated challenges you experienced during this review period in trying to accomplish your goals. What actions have you taken to meet these challenges? How can your advisor help you?

I experienced an unanticipated challenge in 2022. I went to my home country to renew my visa, which was delayed by at least 3 months. As a result, a 1-month trip ended up being as long as 5 months, which severely affected my academic progress and research. I tried to continue attending classes online and making progress in research as much as I could. I was constantly in touch with my advisor, the department, and the university during this time. My advisor was extremely supportive, accommodating, and flexible, which helped me to a great extent.

Advisor comments:

Anik and I have spoken about his progress and he is doing very well. We did not do an IDP last year but Anik's has made a lot of progress over the past year in spite of his visa challenges earlier this year.

Section B. Research goals for next period

To be completed by student

List scientific research goals for the coming period. Make sure each goal is specific, measurable, achievable, realistic, and time-specific.

a) Complete my current project on neutron star mass distributions - finish obtaining data and analyze results by the end of summer 2023

b) Work on my first first-author paper and submit the draft within the academic year 2023-24

c) Take the comprehensive exam by the end of Fall 2023

d) Identify my next project(s) by the end of Fall 2023

Advisor comments:

Anik and I have discussed these goals and we agree that these are well-chosen and achievable within this time frame.

Section C: Individual Development Plan: Goals for next period

To be completed by student

If you want to learn more about how to connect your goals to this framework, discuss with your advisor and try exploring with tools like https://myidp.sciencecareers.org

1. Describe your current career goals and objectives. Have they evolved in the last year?

   My current goal is to pursue a career in academia. I want to do research in theoretical astrophysics and teach the subject. To achieve this goal, I plan to do at least two post-doctorates after my PhD. Encouragement from my advisor has motivated me further in obtaining my goal.

2. Describe your career development or training goals (include both scientific and extra-scientific) for the coming period. You can include new techniques or skills to be learned and publication objectives.

   Training: I am attending the National Nuclear Physics Summer School 2023 at UC Riverside this July. I want to get introduced to the nuclear science community and learn about recent developments in this area. Next year, I want to attend another summer school based on astrophysics with the same goal in mind.

   Learning: I want to know more about LIGO-VIRGO observations of neutron stars and black holes, their techniques and the physics of gravitational waves. In addition, I want to learn about gaussian process emulation and use the concept in my work, along with the deep neural network, to predict neutron star data.

   Publication: I plan to publish at least 3 first-author papers. The first paper will be on my current project on mass distributions of neutron stars in binaries and the equation of state of dense matter. The second would be an extension of the first, with the addition of neutron star–black hole binaries, observational data in which the star masses are unknown but have known mass functions or mass ratios, and microscopic equations of state describing interactions of particles beyond nucleons, such as pions, kaons, and hyperons. The third project is yet to be determined.

3. Will the development program described in 2. get you to your career goals? If not, what is needed or missing? What additional skills or training will you need to accomplish your career objectives?

   I believe that I should do more than what is described above. I need more exposure to the nuclear astrophysics community in the form of collaborating in projects,

attending conferences, and giving talks. This will help me to gain recognition in the community and also enhance my communication skills.

4. Are there opportunities that will assist you in reaching your career objectives? (e.g., meetings, courses or workshops.) Identify specific events if possible.

   There are meetings and conferences that I can attend such as the MUSES, RIT, and NP3M collaborations, which will be useful to reach my career goals. Attending workshops/webinars on gravitational physics will also help in meeting part of my learning objectives described in 2.

5. What assistance can your advisor provide you in accomplishing the above objectives?

   My advisor can help me to identify professional development or training programs such as conferences or workshops that I should attend to meet my career objectives.

Advisor comments:

Anik and I will work together to make sure he is attending meetings and connecting with the scientific community. We will also focus, on the next year, on training so that he can fulfill his career goals of obtaining a postdoc.

Section D: Aligning Expectations

To be completed by advisor. Modify as necessary for your lab.

a) **Takes a thoughtful and rigorous approach to their scientific work.**
_x_Meets standards__Can be improved: (details below) __Not applicable

b) **Seeks and responds to feedback.**
_x_Meets standards __Can be improved: (details below) __Not applicable

c) **Manages conflicts and differences of opinion with skill and sensitivity.**
_x_Meets standards __Can be improved: (details below) __Not applicable

d) **Knows how and when to seek help and assistance in difficult scientific situations.**

_x_Meets standards __Can be improved: (details below) __Not applicable

e) **Is supportive of others in the group by being helpful and by sharing knowledge and resources.**
_x_Meets standards __Can be improved: (details below) __Not applicable

f) **Meets commitments and takes responsibilities (including lab responsibilities) seriously**
_x_Meets standards __Can be improved: (details below) __Not applicable

g) **Demonstrates ability to think independently.**
_x_Meets standards __Can be improved: (details below) __Not applicable

h) **Keeps abreast of relevant literature.**
_x_Meets standards __Can be improved: (details below) __Not applicable

i) **Possesses appropriate technical skills and abilities.**
_x_Meets standards __Can be improved: (details below) __Not applicable

j) **Demonstrates appropriate speaking and writing skills.**
_x_Meets standards __Can be improved: (details below) __Not applicable

k) **Skilled at managing or supervising others (if relevant).**
_x_Meets standards __Can be improved: (details below) __Not applicable

l) **Other (list)**

Advisor comments for above items:

- **Strengths include:**

Anik is very conscientious and has been working hard. He is careful in his work and he has good communication, mathematical, and programming skills.

- **Areas of focus for improvement:**

Over the next year, Anik needs to focus on understanding the full scientific background for his project, in preparation for selecting the topic for his second first-author publication.