Criteria - 5: Student Support and Progression

Report Career Counseling-2021-2021

Central University of Himachal Pradesh

Shahpur, Dist. Kangra

Himachal Pradesh – 176206 India

Index

हिमाचल प्रदेश केन्द्रीय विश्वविद्यालय कोचिंग केंद्र

(शाहपुर कैंपस)

वी मेंटर रिसर्च (डब्ल्यूईएमआर), एक गैर-सरकारी संगठन और केंद्रीय विश्वविद्यालय हिमाचल प्रदेश कोचिंग सेंटर (शाहपुर कैंपस) द्वारा संयुक्त रूप से विभिन्न अनुसंधान नौकरियों, आवश्यक योग्यता, अपेक्षित कौशल प्रोफ़ाइल और कैरियर के अवसरों पर एक जागरूकता कार्यशाला का आयोजन किया गया। यह संगोष्ठी 23-05-2022 को शाहपुर परिसर के संगोष्ठी हॉल में आयोजित की गई थी। संगोष्ठी का संचालन **डॉ. ममत अग्रवल**, मुंबई विश्वविद्यालय द्वारा किया गया और **प्रो. ओएसकेएस शस्त्री** द्वारा समन्वयित किया गया। संगोष्ठी का उद्देश्य स्नातक, स्नातकोत्तर और शोध डिग्री छात्रों को भारत और विदेशों में अनुसंधान प्रयोगशालाओं में उपलब्ध विभिन्न वैज्ञानिक कैरियर के अवसरों के बारे में जागरूक करना था। इसके अलावा, संगोष्ठी का उद्देश्य युवा दिमागों को वैज्ञानिक अनुसंधान में करियर बनाने और देश में अनुसंधान और नवाचार में योगदान करने के लिए सशक्त बनाना और मार्गदर्शन करना भी था। विशेषज्ञ ने इन अवसरों का लाभ उठाने के लिए आवश्यक कौशल के बारे में भी विस्तार से बताया।

हेलो न्यूक्लियस के परिचय के साथ चर्चा की शुरुआत करते हुए, विशेषज्ञ ने भारत और विदेशों में अनुसंधान प्रयोगशालाओं में उपलब्ध विभिन्न शोध कैरियर के अवसरों पर विस्तार से बताया। सीयूएचपी कोचिंग सेंटर, विभाग के इच्छुक छात्रों के लिए इस तरह के एक ज्ञानवर्धक संगोष्ठी आयोजित करने के हमारे अनुरोध को स्वीकार करने के लिए **प्रो. शस्त्री** की सराहना धन्यवाद करता है।

संगोष्ठी समन्वयक

प्रो. ओएसकेएस शास्त्री

An Awareness Workshop

PATH TO SCIENTIFIC RESEARCH

Synopsis of Research Job Opportunities, Facilities and Network in India.

Jointly Organised by

WeMR (We Mentor Research)
A Skill Foundation Initiative
&
Central University of Himachal Pradesh

Event Details

23 May, 2022

11:30 am IST

Central University of Himachal Pradesh, Shahpur, Dist-Kangra, HP-176215.

Scan QR code to Register, before midnight of 22/05/22.

Special Lecture on

EXOTIC NUCLEI: A New World to Explore

Unstable, radioactive and short-life nuclei with unusual structures like large extension of matter, halo or neutron skin, shell structure with new magic numbers are called are called Exotic Nuclei. Their properties, different from stable isotope(s), are useful in the study of Nuclear Models.

Speaker

Dr. Mamta Aggarwal.
Scientist, Dept. of Physics,
University of Mumbai
Founder, WeMR & Skill Foundation.

Dr. Mamta Aggarwal is a theoretical Nuclear Physics scientist, working at Dept. of Physics, Univ. of Mumbai. Her research interests are Hot rotating nuclei, Nuclear level density, Exotic Nuclei and Neutron halo. She is DST Scientist, elected fellow of Academy of Sciences, Chennai, Member of Editorial Board, JNPMSRA and Reviewer at Canadian Journal of Physics and JNPMSRA. In her research career of over 20 years, she has worked at eminent institutes like TIFR(Mumbai), IUAC(Delhi). She has been involved in philanthropic work through Skill Foundation and WeMR, for social concerns like women in science, academic research green movement to save the enviornment, computer literacy and job oriented skills for under-privileged section of the society.

WeMR

We mentor Research is an initiatives of Skill Foundation, aims to empower and guide the young students to pursue career in scientific research, and contribute towards the research and innovation in the country. WeMR is a large pool of eminent scientists across the country as the Scientific Associates and Mentor, who willingly contribute to guide students via Lecture series, Short Courses and Mentoring Sessions.

Conveners

Dr. Mamta Aggarwal,
Univ. of Mumbai.

Prof. O. S. K. S. Sastri,
Central Univ. of Himachal Pradesh.

Coordinators

Prof. O. S. K. S. Sastri,
&
Central Univ. of Himachal Pradesh,
Coaching Centre (Shahpur Campus).

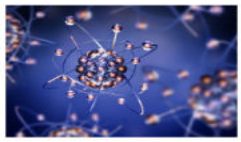
An Awareness workshop on

The Path to Scientific Research"- Research opportunities, facilities and network in India'

Jointly organized by

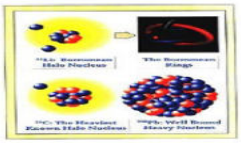
We Mentor Research (WeMR), Skill Foundation, &
Central University of Himachal Pradesh, Dharamashala

To motivate students to pursue Research in Science



Exotic Nuclei

- *A new world to explore*



Dr. Mamta Aggarwal

Department of Physics, Mumbai University,
Mumbai. India

In India - major accelerator related programs are being pursued at

1. BARC (Bhabha Atomic research center Mumbai)

2. TIFR (Tata Institute of Fundamental research), Mumbai.

3. VECC (Variable energy Cyclotron Center), Calcutta.

4. NSC (Nuclear Science Center) now IUAC (Inter University Accelerator Center, Delhi

Scientist - after M.Sc
Or Join Ph.D
Do projects

5. CAT-Indore

And many more

India is also collaborating with major international accelerator facilities in Europe, USA and Japan. Our Scientists are participating and contributing equally internationally.

Advanced Experimental Accelerator facilities worldwide

1. RIBF (RIKEN, Wako, Japan),
2. HIRLF-CSR (IMP, Lanzhou, China),
3. BRIF2 (CIAE, Beijing, China),
4. VECC RIB (Calcutta, India),
5. KoRIA (Daejun, Korea),
6. HIAF (Lanzhou, China)
7. ADS p-LINAC (China)
8. National Institute for Nuclear Physics (INFN), Italy
9. Helmholtz Association of German Research Centres, Germany
10. European Organization for Nuclear Research (CERN), Switzerland
11. Max Planck Society, Germany

Various Govt organizations of scientific research

Where one works as a Scientist

1) **DAE (Department of Atomic Energy)** Govt. of India

https://dae.gov.in/node/77

- Bhabha Atomic Research Centre (BARC), Mumbai
- Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam (near Chennai)
- Raja Ramanna Centre for Advanced Technology, Indore.
- Variable Energy Cyclotron Centre (VECC), Kolkata
- Atomic Minerals Directorate for Exploration and Research, Delhi, Hyderabad, Nagpur, Jaipur, Shillong, Bangalore, Kolkata
- Harish-Chandra Research Institute (HRI), Prayagraj (Allahabad).

Also find research oriented Govt. Job related Info @ :

http://employmentnews.gov.in/NewEmp/Home.aspx

Also we have

IIT's, IISc, Bangalore, IISER's , NISER....

The Institute of Mathmatical Sciences (IMSc), Chennai.

https://www.imsc.res.in/

SNBNC (S. N. Bose National Center for Basic Sciences), Kolkata. https://www.bose.res.in/

SINP (Saha Inst. for Nuclear Physics), Kolkata.

http://www.saha.ac.in/

JNCASR (J. Nehru Center for Adv Scientific Research)

www.jncasr.ac.in

These are all wonderful places of learning where all kinds of ideas of

- **Science**
- **IT**
- **Software**
- **Hardware**
- **Engineering**
- **Application**
- **Innovation**

are applied

you have to dream and make efforts- Then -

Its all yours

Top Funding Agencies	
Department of science & Technology (DST)	India
Council of Scientific & Industrial Research (CSIR)	India
University Grants Commission (UGC)	India
Department of Biotechnology (DBT)	India
Board of Research in Nuclear Science (BRNS)	India
Defence Research & development Organization (DRDO)	India
Indian council of Agriculture Research (ICAR)	India
Indian Council of Medical Research (ICMR)	India

Varoius ***Private sector companies*** working in fields like Semiconductors, fuels, Energy, Led's, Sensors, optical components batteries, IT, networking, programming, etc..... *Also hire*

Science graduates, Post graduates and Ph.D's

e.g. GE India, Thorlab, Phillips India, Samsung, Thermax India, INTEL, IBM, Reliance

https://www.linkedin.com/jobs/view/

Another interesting & great career option:

Science Communicator/writer

Scientific media, Science journalism, blogger in scientific research institutes, writers, communicators for R & D labs & Academicians, journal publishers, Science writers in regional languages

Many other areas where Scientific minds needed/hired;

Forensic Science –http://dfs.nic.in/, dfsl.maharashtra.gov.in
UPSC, SSC – regularly advertise for positions of senior , Junior Scientific officers.

- **Toxicology (Study of chemicals on living organisms) - B.SC, M.Sc (Bio/Chem)**
- **Biology/Serology (Study of bones, hair, nails etc.) - B.Sc, M.Sc (Bio.)**
- **Ballistics (study of Gun shooting incidents)– B.Sc, M.Sc (Physics)**
- **Physics (Study of materials) -B.Sc, M.Sc (Physics)**
- **Audio- B.Sc, M.Sc (Physics)**
- **Cyber (computer related proofs) - B.Sc, M.Sc (Physics)**
- **DNA (Study of DNA)- B.Sc, M.Sc (Bio.)**

- **Try to acquire skills – add them to your CV**
- **Find a mentor, talk to scientists, listen to their work where ever you get a chance**
- **Write to various universities/research Insts/ look for an internship with them. You may find one.**
- **Apply to different internship programs.**
- **look for various computer courses**
- **Look for various govt jobs, start-up grants, Internships**
- **Build a good CV – with lots of work, hands on experiences, research experience, Various skills**

Chandra STAR Club
Science Popularisation club, by Department of Physics and Astronomical Science CUHP

Follow

Exoplanet Workshop on Extra-solar Planets and the search for the Habitable Worlds

Workshop, *CUHP, DPAS, Shahpur*, 2022

Speaker: Prof. Anand Narayan from Indian Institute of Space Science and Technology

Theme of workshop : DPAS is organizing a short-term course on the detection and characterization of extra-solar planets from 4th July to 15 July 2022. The course will be given by Prof. Anand Narayan from Indian Institute of Space Science and Technology, with daily interaction of 1-2 hours and hand on sessions. The main motivation for this short course is that the study of exoplanets is a fast developing field, with potential for many interesting future discoveries. The course will cover, in a quantitative way, the techniques that have been most successful in finding planets around other stars, the search for biomarkers in exoplanet atmospheres, and the speculations on the potential habitability of exoworlds. The course would also involve two programming based mini-projects with hand on activities, where the students will learn the technique used in this field, as well as get a feel for possibilities of any other civilizations in this vast Universe. The registered participants will also get the certification of participation.Please fill the form below for the registration before 12:00hr on 16th May 2022.

Programm Schedule: July 4th-15th, 2022

List of Participants

| S.NO | Name of Participants | Program of Study | | ————- | ————- | ———— |
| 1 | Ajay Kumar | M.Sc | | 2 | Akshay Kumar | M.Sc | | 3 | Aman Kumar | M.Sc | | 4 | Amit Jaswal | B.Sc | | 5 | Anshika Ohri | B.Sc | | 6 | Anshul Kumar Sharma | B.Sc | | 7 | Anshul Choudhary | B.Sc | | 8 | Anuraag Rathore | M.Sc | | 9 | Aryaa Pathak | M.Sc | | 10 | Disha | B.Sc | | 11 | Diya Sharma | B.Sc | | 12 | Gargi Rathore | B.Sc | | 13 | Harsh Singh | M.Sc | | 14 | Jaideep | M.Sc | | 15 | Kanika Mankotia | B.Sc | | 16 | Kanika | B.Sc | | 17 | Khushi Sharma | B.Sc | | 18 | Manish Pathak | M.Sc | | 19 | Nalin Dhiman | M.Sc | | 20 | Praveen | M.Sc | | 21 | Priya Sharma | M.Sc | | 22 | Sachin Thakur | M.Sc | | 23 | Sachin Dharwal | B.Sc | | 24 | Sakshi Mehra | M.Sc | | 25 | Sahil Singh | M.Sc | | 26 | Tanvi Sharma | B.Sc | | 27 | Urvarshi | M.Sc | | 28 | Yogesh | M.Sc |

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EXTRASOLAR PLANETS

THE SEARCH FOR HABITABLE WORLDS ELSEWHERE IN THE UNIVERSE

COURSE OVERVIEW

For centuries, perhaps even millennia, humankind has been speculating on the possibility of finding worlds beyond the solar system that are potentially safe havens for life. But it is only in the last three decades, with the growing number of discoveries of planets orbiting other stars, that it has finally become possible to address this question in a meaningful way. Extrasolar planets, or exoplanets for short, is a collective term for such planets.

Prior to 1995, the only planetary system that we knew of was our own solar system. In the three decades since then, the number of exoplanets has swelled in numbers to several thousand now. Entire new areas of research have unfolded in this domain, and there is a renewed hope that we are finally ready to take the first crucial step towards answering the most consequential of all questions - are we alone in the universe?

The statistics are compelling. Nearly all the stars that we see in the night sky possibly have one or more planets revolving around them; it is just a matter of finding them. Several ground-based and space-based missions are now in place making those important discoveries gradually changing the way we understand planets around stars and the prospects of life elsewhere in the universe.

This short-term course will, in a quantitative way, discuss how astronomers discover those planets around other stars, how the question of the habitability of those exoplanets is addressed, and what the future holds for research in this field. As an introductory course, it will give you the necessary background for a deeper learning on this topic.

1. Exoplanets: Hidden Worlds & the Quest for Extraterrestrial Life / Donald Goldsmith
2. Exoplanets / edited by Sara Seager
3. How to find a Habitable Planet / James Kasting
4. Astrobiology: Understanding Life in the Universe / Charles Cockell

These books are expensive. You need not buy them. The lecture notes and slides from this course will be adequate for an introductory understanding. The above list is only meant as a reference in case you wish to delve deeper into this topic.

Online Resources

1. Exoplanet Detection Techniques: A Concise Essay
2. NASA Exoplanet Archive
3. An Introduction to Exoplanets (a free course from the Open University)

Week 1 : challenges in direct imaging / radial velocity method

Week 2 : transit method / direct imaging

Week 3: direct imaging / search for biomarkers / SETI

Lecture Slides

October 29 - 30 slides / radial velocity

November 2 slides / radial velocity

November 8 slides / transit method

November 9 slides - A / transit method

November 9 slides - B / transit method

November 12 slides / direct imaging

November 16 slides / habitability and exo-atmosphere detection

SHORT-TERM COURSE ON EXOPLANETS

1) Problem Set - 1 / Solutions

2) Problem Set - 2 / Solutions

3) Problem Set - 3 / Solutions

4) Problem Set - 4 / Solutions

5) Problem Set - 5 / No solutions for this

SHORT-TERM COURSE ON EXOPLANETS

TASK 1: Generate a set of synthetic radial velocity curves for the following orbital configurations of the star-exoplanet system.

the angle of inclination of orbit, i = 60 degree
semi-major axis of orbit, a* = 0.05 AU
orbital period, P = 5 years (Earth years)
mass of the star, M* = 1 solar mass

(a) Make four RV curves for e = 0 and omega = 0, 30, 60, and 90 degrees
(b) Make four RV curves for e = 0.7 and omega = 0, 30, 60, and 90 degrees

You can make four separate RV curves for each eccentricity, or in the same plot you can show omega = 0, 30, 60, 90 degree using four different colours

The plot should have the phase of the orbit ranging from 0 to 720 degrees along the X-axis and the radial velocity (km/s) along the Y-axis. The axes should be properly labeled with a suitable choice for the X and Y axes ranges.

Deadline: November 9, 2022 (Wednesday evening class)

TASK 2: Convert the horizontal axis from orbital phase to orbital time for the same exoplanet configuration as TASK 1. Once you accomplish this successfully, generate four different GIF animations that show how the RV signal would change with eccentricity e ranging from 0 to 0.9 in steps of 0.1 for ω values of 0, 30, 60, 90 deg.

See this **document** on how to correctly bring-in the time axis into the synthetic RV model

Deadline: November 12, 2022 (Saturday class)

TASK 3: Download the radial velocity data for the star 51 Pegasi (the first main-sequence star around which an exoplanet was discovered) from the link given below. The first column is time in terms of a reference Julian date, the second column is the radial velocity in meters per second, and the third column is the uncertainty in radial velocity, also in meters per second. The data is like a time series.

RV data for 51 Pegasi

As a first step just plot time vs. radial velocity and see how the data point is scattered. Plot each data point as a big filled circle. From that make a guess-estimate of the time period.

Now estimate the time period of the exoplanet more formally by subjecting the RV data to a Lomb - Scargle periodogram analysis. Scipy module in python already has a Lomb - Scargle periodogram routine.

Based on the periodogram output, try folding this data to the predicted time period and see how the folded radial velocity data plot looks like. [Complete up to this point. In next class we will discuss how to proceed from here]

Develop a code that would generate the transit duration curve as a function of orbital separation between a planet and its host star for any user-given star-planet system.

Use that code to generate plots of transit duration (in Earth days or Earth hours) vs. orbital radius (in AU) for the following scenarios.

Jupiter size planet in orbit around a Sun-like star, for (a) i = 90 deg, (b) i = 89.9 deg (c) i = 89.5 deg

and (d) 89 deg

Since the question is about a Jupiter-Sun like system, for $R*$, Rp, a, P etc use the same values as that of

the Jupiter-Sun system. Look up these quantities from the internet. Make sure to convert everything to

the same units.

The vertical axis should be transit duration in days or hours and X-axis should be the orbital separation

of the planet from the star in units of AU. Put all configurations in a single plot with different curve

styles (dotted, dashed, solid line etc), and in different colours. Clearly label which curve corresponds

to which scenario.

Derivation Notes

1) Reduced mass and Kepler's third law of planetary motion

2) Shift in Wavelength and Radial Velocity Relation

[Anand Narayanan] [Indian Institute of Space Science & Technology]


Radial Velocity Method


हिमाचल प्रदेश केन्द्रीय विश्वविद्यालय