

**INDIA- JAPAN COOPERATIVE SCIENCE PROGRAMME  
COMMULATIVE PROGRESS REPORT FOR THE  
COLLABORATION**

1. **Priority area of project:** *Astronomy, Astrophysics, and Space & Planetary Science*
  
2. **Title of the project:** *Investigation of Interstellar Polycyclic Aromatic Hydrocarbons (PAHs), Pure and Substituted: A combined approach*
  
3. **DST's Reference No. Starting Date and Duration and total cost ( for Projects):** *Ref no: DST/INT/JSPS/P-238/2017 Dated 04-10-2017*  
*Starting Date: 24-10-2017*  
*Duration: 2 Years*  
*Total cost: Rs. 10,60,000.00 (Ten Lakh Sixty Thousands only)*
  
4. **Details of collaborating Scientist and Institute:**  
*Dr. Itsuki Sakon, Dept. of Astronomy, The University of Tokyo*

**INDIAN SIDE**

**Principal Investigator**

Name	<b>Dr. Amit Pathak (formerly at Tezpur University) / Dr. Gazi Ameen Ahmed</b>
Institute	<b>Tezpur University</b>

**JAPANESE SIDE**

**Principal Investigator**

Name	<b>Dr. Itsuki Sakon</b>
Institute	<b>The University of Tokyo</b>

5. **Month & Year Since collaboration started Originally:** *The collaboration between Amit Pathak and Itsuki Sakon was being discussed since August, 2005. There had been several e-mail exchanges and meetings (specially at conferences of mutual interest). DST-JSPS grant gave an excellent opportunity to formalize and concretize the collaboration.*

**6. Visits Undertaken in the Report Period: 07 visits ( including Indian and Japanese side)**

**6.1 From India to Japan**

No.	Name and Institute of Indian scientist/student	Japanese Host Scientist(s) and Institutes Visited	Duration From To
1.	Ms. Mridusmita Buragohain, Tezpur University	Dr. Itsuki Sakon, The University of Tokyo	March 04 – 26, 2018
2.	Ms. Mridusmita Buragohain, Tezpur University	Dr. Itsuki Sakon, The University of Tokyo	August 7 – 19, 2019
3.	Dr. Gazi Ameen Ahmed Tezpur University	Dr. Itsuki Sakon, The University of Tokyo	March 23 – 30, 2019
4.	Dr. Amit Pathak Banaras Hindu University	Dr. Itsuki Sakon, The University of Tokyo	March 27 – 30, 2019

**6.1.1. No. of scientist visited: 2**

**6.1.2 No. of student visited: 1 (two times)**

**6.2 From Japan to India**

No.	Name and Institute of Japanese scientist/student	Indian Host Scientist(s) and Institutes Visited	Duration From To
1.	Ms. Izumi Endo, The University of Tokyo	Dr. Gazi Ameen Ahmed Tezpur University	October 28 – 30, 2018
2.	Professor Takashi Onaka, The University of Tokyo	Dr. Amit Pathak Banaras Hindu University	February 11 – 14, 2019
3.	Ms. Izumi Endo, The University of Tokyo	Dr. Amit Pathak Banaras Hindu University	February 11 – 14, 2019

## 7. Salient points of Scientific and Technical Results obtained:

No.	Objectives of the projects	Achieved, briefly indicate If not why?
1.	Theoretical spectroscopic study of deuterated PAH molecules in relation to 4.65 micron bands	Deuterated PAH molecules are proposed as potential candidate carriers for 4.65 micron bands.
2.	To see the effect of increasing size of deuterated PAH molecules on spectral data and make comparison with observation	Large size of deuterated PAH molecules show a D/H ratio that is comparable to the observed D/H ratio.
3.	Observations using 'SUBARU' telescope to study deuterium abundance	Proposal for observation using SUBARU telescope was accepted. Data have been obtained and reduced. Analysis is in process
4.	To study dehydrogenated PAHs	A comprehensive study of dehydrogenated PAHs and their anions have been done. The data have been shared with the Japanese collaborators. <b>Manuscript published in MNRAS.</b>

## 8. Devices/ Instrument/Facilities Developed/ Patent field: *SUBARU/COMICS, Gaussian*

## 9. Number of Joint Publication as Result of Collaboration: 01 (List may also be enclosed separately)

**9.1 Number of Joint publications published in Journal:** *Manuscript under preparation (DFT study on interstellar PAH molecules with aliphatic side groups, M. Buragohain, A. Pathak, T. Onaka, I. Sakon, under preparation)*

## 9.2 Number of Joint publications presented in seminar/workshop/conference:

- i) "DFT study of interstellar PAH molecules with aliphatic side groups", M. Buragohain, A. Pathak, P. J. Sarre, T. Onaka & I. Sakon, presented in the "37th meeting of the Astronomical Society of India (ASI 2019)", organized by Christ University, Bengaluru, February 18-22, 2019.

## 10. Training of Scientific Manpower /Advanced facility utilized in Japan:

- i) Ms. M. Buragohain has been trained to do Data Reduction and Analysis of the SUBARU-COMICS Telescope.
- ii) Gaussian has been used to perform DFT calculation.

## 11. Number of Patents: Nil

## **12. Brief Remark on usefulness of the Collaboration:**

(For both Indian as well as the Japanese side)

*For quality research, a combined study of theory and observation is of immense importance. Indian side have been involved in theoretical spectroscopic study of interstellar PAH molecules. These theoretical results are used to understand the observed features in the interstellar medium by making comparison with the observational data. The observational counterpart has been carried out by Japanese side.*

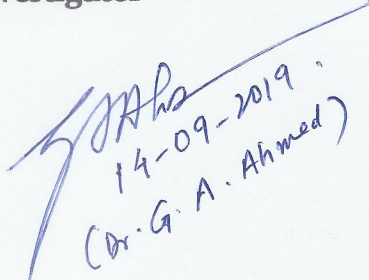
**The most important achievement of the collaborative effort was the award of PhD to Ms. Mridusmita Buragohain. Her thesis includes the study of interstellar PAHs which forms the main objective of our Indo-Japanese collaboration.**

## **13. Collaborative Activities envisaged in near Future:**

*The project aims to use SUBARU-COMICS data to identify interstellar PAH molecules. With the advancement in high resolution space observations and theoretical methodology, it is likely that PAH identification is possible in the coming future. SUBARU-COMICS data have been obtained for sources with high deuterium content to study deuterium abundance in the interstellar medium. Analysis of the data is in process. The observation is part of our existing collaboration with the University of Tokyo. In coming future, observations with JWST and SPICA will be planned accordingly.*

*Currently, the collaboration is focused on the theoretical and experimental study on Nitrogen-PAHs (PANHs) for its possible identification in the astronomical sources.*

**Signature with Date of the Principal Investigator**

  
14-09-2019  
(Dr. G. A. Ahmed)

**GFR 12 – A**  
**[(SEE RULE 238 (1))]**  
**FORM OF UTILIZATION CERTIFICATE FOR THE GRANTEE ORGANIZATION INCLUDING**  
**AUTONOMOUS ORGANIZATIONS**

UTILIZATION CERTIFICATE FOR THE YEAR 2018-2019  
(period ending 31<sup>st</sup> March, 2019)  
In respect of recurring/non-recurring  
**GRANT-IN-AID/SALARIES/CREATION OF CAPITAL ASSETS**

1. Name of the scheme: **Investigation of Interstellar Polycyclic Aromatic Hydrocarbons (PAHs), pure and substituted : A combined approach**
2. Whether recurring or non-recurring grants: **Non-Recurring grant**
3. Grants position at the beginning of the financial year
  - (i) Cash in Hand/Bank: **Rs. 4,28,293.00**
  - (ii) Unadjusted advances: **N/A**
  - (iii) Total: **Rs. 4,28,293.00**

4. Details of grants received, expenditure incurred and closing balances: (Actuals)

Unspent Balances of Grants received in 1 <sup>st</sup> year [figure as at SI No 3(iii)]	Interest earned thereon	Interest deposited back to the government (through www.bh aratkosh. gov.in)	Grant received during the year (FY2018-2019)			Total Available funds (1+2-3+4)	Expenditure incurred	Closing Balance (5-6)
			Sanction no.	Date	Amount (iii)			
1	2	3	4			5	6	7
	(2 <sup>nd</sup> yr)	(1 <sup>st</sup> yr + 2 <sup>nd</sup> yr)	(i)	(ii)	(iii)			
4,28,293.00	3,601.00	6,155.00			nil	4,25,739.00	2,90,434.00	1,35,305.00

5. Component wise utilization of grants:

Grants-in-aid- General	Grant-in-aid -Salary	Grants-in-aid-creation of capital	Total
2,90,434.00			2,90,434.00

6. Details of grants position at end of the year
  - (i) Cash in Hand Bank: **Rs. 1,35,305.00/-**
  - ii) Unadjusted Advance: **nil**
  - (iii) Total: **Rs. 1,35,305.00/-**
7. Certified that I have satisfied myself that the conditions on which grants were sanctioned have been duly fulfilled /are being fulfilled and that I have exercised following checks to see that the money has been actually utilized for the purpose for which it was sanctioned:

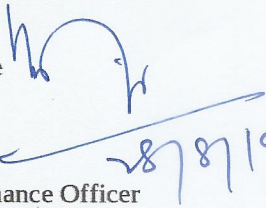
*[Signature]*  
07-08-19

- (i) The main accounts and other subsidiary accounts and registers (including assets register) are maintained as prescribed in the relevant Act/Rules/standing instructions (mention the Act/Rules) and have been duly audited by designated auditors. The figures depicted above tally with the audited figures mentioned in financial statements/accounts.
- (ii) There exist internal controls for safeguarding public funds/assets, watching outcomes and achievements of physical targets against the financial inputs, ensuring quality in asset creation etc. & the periodic evaluation of internal controls is exercised to ensure their effectiveness.
- (iii) To the best of our knowledge and belief, no transactions have been entered that are in violation of relevant Act/Rules/standing instructions and scheme guidelines.
- (iv) The responsibilities among the key functionaries for execution of the scheme have been assigned in clear terms and are not general in nature.
- (v) The benefits were extended to the intended beneficiaries and only such areas/districts were covered where the scheme was intended to operate.
- (vi) The expenditure on various components of the scheme was in the proportions authorized as per the scheme guidelines and terms and conditions of the grants-in-aid.
- (vii) It has been ensured that the physical and financial performance under.....(name of the scheme has been according to the requirements, as prescribed in the guidelines issued by Govt. of India and the performance/targets achieved statement for the year to which the utilization of the fund resulted in outcomes give at Annexure- I duly enclosed.
- (viii) The utilization of the fund resulted in outcomes given at Annexure – II duly enclosed (to be formulated by the Ministry /Department concerned as per their requirements/specifications.)
- (ix) Details of various schemes executed by the agency through grants-in-aid received from the same Ministry or from other Ministries is enclosed at Annexure—II (to be formulated by the Ministry/Department concerned as per their requirements/specifications).

Date:

Place:

Signature

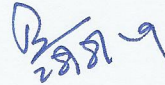


Name

Chief Finance Officer  
(Head of the Finance)

Finance Officer  
Tezpur University

Signature



Name

Head of the Organisation

Registrar  
Tezpur University

(TO BE FILLED IN BY DST)

2. Certified that I have satisfied myself that the conditions on which the grants-in-aid was sanctioned have been fulfilled/are being fulfilled and that I have exercised the following checks to see that the money was actually utilised for the purpose for which it was sanctioned:

Kinds of checks exercised.

- 1.
- 2.
- 3.
- 4.
- 5.

Signature  
Designation  
Date

  
07.08.19

**Annexure - II**

**REQUEST FOR ANNUAL INSTALLMENT WITH  
UP-TO-DATE STATEMENT OF EXPENDITURE**

*(Year Means Financial Year i.e.. 1 st April to 31 st March of Next Year)*

- |   |  |
|---|--|
| 1. Sanction Letter No. <b>DST/INT/JSPS/P-238/2017</b><br><b>Dated: 04-10-2017</b> | 6. Grant Received in each year:  |
| 2. Total Project Cost: <b>Rs. 10,60,000.00</b>                                    | a. I year <b>Rs. 5,00,000.00</b>   |
| 3. Sanctioned/Revised<br>project cost<br>(if applicable)                          | b. II year <b>Rs.</b>  |
| 4. Date of commencement<br>of Project: <b>24-10-2017</b>                          | c. III year <b>Rs.</b>   |
| 5. Statement of Expenditure ( <b>FY 2018-2019</b> )                               | d. Interest, <b>Rs. 6,155</b><br>if any <b>(2,554.00 on 1<sup>st</sup> year +<br/>Rs. 3,601.00 on 2<sup>nd</sup> year)</b> |
|   | e. Total <b>Rs. 5,06,155.00</b>  |

Month	Year	Expenditure Incurred
August	2018	Rs. 73,999.00
October	2018	Rs. 16,835.00
February	2019	Rs. 19,739.00
March	2019	Rs. 1,79,861.00
<b>Total</b>		<b>Rs. 2,90,434.00</b>

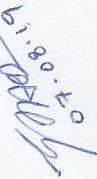
**Note:**

1. Expenditure under the sanctioned heads, at any point of time, should not exceed funds allocated under the head, without prior approval of DST i.e. Figures in Column (vii) should not exceed corresponding figures in Column (iii)
2. Utilisation Certificate for each financial year ending 31st March has to be enclosed, along with request for carry-forward permission to next year

*[Signature]*  
07-08-19

**Annexure IInd Continued**

Sl. No.	Sanctioned (original)	Funds Allocated (*) (original)	Funds Received In annual Year 2017-2018 (1 <sup>st</sup> installment)	Funds Received In annual Year 2018-2019 (2 <sup>nd</sup> installment)	Expenditure Incurred				Balance as on date [Col. { (iv(a)+iv(b)) - viii} ix.	Required Funds till 31 March x.	Remarks (if any) xi.
					I Yr. (2017-2018) v.	II Yr. (2018-2019) vi.	III Yr. vii.	Total (v+vi+vii) viii.			
1.	Heads** (original)	Allocated (*) (original)	iv(a)	iv(b)							
2.	Salaries	iii.									
3.	Permanent Equipments										
4.	Supplies & Materials/consumables										
5.	Travel of Indian Scientists Abroad										
a)	International Travel cost	1,50,000.00 + 5,000.00 (visa fee)	1,50,000.00 + 5,000.00 (visa fee)		63,021.00 (air fare from Guwahati to Tokyo + Taxi from Tezpur University to Guwahati Airport) + Visa charge						
b)	Domestic Travel	45,000.00	45,000.00			2,41,159.00					
c)	Overseas Insurance	5,000.00	5,000.00		1,310.00						
5.	Hospitality of Foreign Scientists - Per diem @ Rs. _____ - Accommodation										
a)	Per diem	60,000.00 (@ 1,000/-)	60,000.00 (@ 1,000/-)								
									1,35,305		

61.80.10  




b)	Accommodation	1,80,000.00 (@ 3,000/-)	1,80,000.00 (@ 3,000/-)									
c)	Airport tax & Airport transfers											
d)	Domestic travel	75,000.00 (includes domestic travel)	45,000.00 (includes domestic travel)									
6.	Contingencies	10,000.00	10,000.00		9,930.00							
7.	Overhead Expenses											
8.	Interest earned		2,554.00									
	Total	5,30,000.00	5,02,554.00		74,261.00		2,90,434.00		3,70,850.00		36,574.00	1,35,305.00

Note : \* Please indicate heads and allocation as per original / revised (if any) sanction order approving/ revising the project

Name & Signature

*[Signature]*  
07.08.19  
Associate Professor  
Dept. Of Physics  
Tezpur University

*[Signature]*  
Signature of Competent financial authority  
Finance Officer  
Tezpur University

Principal Investigator: DR. GAZI AMEEN AHMED

Date:

Date: 07 - 08 - 2019

**Bharat Kosh**


(Toll free No.1800 118 111)

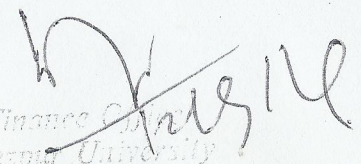
**Deposit / Pay-in-slip - NEFT / RTGS**

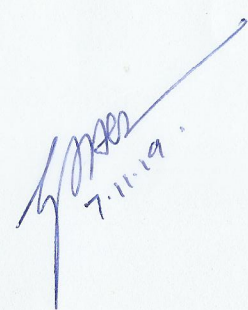
URN No. (for Departmental Use)	25829811091900003013		Beneficiary (PAO) A/C No. :	10598801010		
<b>Note</b> : Please provide this URN No. at the Remarks column at the NEFT/ RTGS slip. Officials at Bank's counter himself/herself need to ensure that the remitter Bank A/c no & the depositor being used for the NEFT/ RTGS Instruction is same as what is printed on this deposit slip. Any error in entry of this A/c no. will lead to non-delivery of services expected in lieu of this payment to Government of India.			Beneficiary (PAO) IFSC Code :	RBISOMBPA04		
			Beneficiary (PAO) Account Type :	Current Accout		
			Remitter's Bank Name :	STATE BANK OF INDIA		
			Remitter's Bank A/C No. :	30448821505		
			Remitter's Bank IFSC Code :	SBIN0000195		
			Payment Period/ Frequency :	No Restriction		
<b>Remitter Name</b>	<b>Department / office from whose books the demand emanated</b>	<b>Full particulars of the nature of remittance and/or authority (if any)</b>	<b>Amount</b>	<b>Head of Account</b>	<b>Beneficiary Name (PAO)&amp; Code</b>	<b>Remarks</b>
Tezpur University	Pr.A.O.,DEPARTMENT OF SCIENCE AND TECHNOLOGY. (H.Q), TECH. BHAWAN. NEW DELHI - 16 (258298)	interest receipt on unspent balances,REFUND OF UNSPENT BALANCES DST	6,155.00	00490180000000-0-MISCELLANEOUS INTEREST RECEIPTS	PAO(DST), New Delhi (058296)	Being interest refunded
			<b>Total :</b>	<b>6,155.00</b>		

(In words) Rupees : Six Thousand One Hundred Fifty-Five Only

<b>For Bank's Usage</b>	
NEFT Request Received Date	
Transaction Amount	
NEFT Charges	
NEFT UTR No	
Deposit Slip Created Date	11/09/2019 (This Deposit Slip is Valid for 15 Days till 26/09/2019)
<b>Note</b> : Please enter the UTR Number at the <b>Track your Payment / Payment history</b> link available at NTRP, as soon as you complete the NEFT/RTGS payment and receive a UTR Number from your Bank. If you fail to do so, the system will not be able to generate the transaction receipt.	
<b>Remark</b> :This Deposit slip is valid for 15 days from the date of creation of deposit slip at NTRP, please make sure to do the NEFT/RTGS within 15 days, else the NEFT will not be accepted and treated as invalid".	
<b>Courtsey :- Public Financial Management System</b>	

  
Dy Registrar (Finance)  
Tezpur University

  
Finance Officer  
Tezpur University

  
7.11.19