

エクステンジプログラム報告書

1. 招へい者（派遣者）の氏名と滞在期間、滞在先を全員分書いてください

氏名：Sebastian Müller

滞在期間：2009年9月1日－2009年11月30日

滞在先：CPS

2. 受け入れ担当者の氏名と所属

木村 宏（CPS）

町井 渚（神戸大学大学院理学研究科）

3. 招へい（派遣）の目的を2－3行で

日本国内のダスト研究グループをMüller氏が訪問することで各大学間連携を促し、現在のCPS－イェナ間のエクステンジプログラムを大学の枠を超えた人の交流が図れるようなプログラムに発展させることを目的とする。また、日本とドイツ間の国際連携を発展させるためのネットワークを構築し、将来的にCPSを国際ネットワークのハブ機関とする下地を作る。科学的アウトプットとしては、CPSだけでなく、北海道大学のダスト理論グループ、大阪大学のダスト円盤観測グループとダスト実験グループ、名古屋大学の衝突実験グループと議論を重ねることで、ダストの力学／衝突モデルと円盤観測結果とをリンクするダストの熱輻射モデルを構築することが期待される。

4. 成果報告（用紙が不足の場合は足してください）

次ページにて報告します。

Final report on the scientific exchange of S. Müller

between

**CPS,
Japan**

and

**AIU, Friedrich-Schiller-University Jena,
Germany**

The Project

The scientific visit of Sebastian Müller at the *Center for Planetary Sciences (CPS)* in Kobe lasted from September 1 to November 30. During this time he was supervised by Hiroshi Kimura. Mr. Müller is a PhD student at the Friedrich-Schiller-University Jena, Germany, supervised by Prof. Alexander V. Krivov.

Scientifically, his work in Kobe was focused on the incorporation of porosity in the approach of modeling debris disks, which was developed in the Jena group. Debris disks are believed to be the remnants of planet formation comprising solid material from dust to planetesimal sized bodies and possible planets, but are most likely lacking an appreciable amount of gas. The asteroid and Kuiper belt in the solar system are two examples of such systems in our close vicinity. Based on a statistical approach, in recent years the Jena group developed a powerful tool to model such disks including several physical effects. Only recently they have shown that their way of modeling is capable of reproducing the results of debris disk observations. However, one assumption for the modeling has always been that the considered objects are compact. Measurements on IDPs and asteroids indicate that material surrounding the central star are somewhat porous, though. Thus, the step is close to use the possibility for modeling debris disks together with the expertise of researchers at Kobe university in terms of theoretically modeling the dynamics of porous dust and of laboratory work to measure the collisional outcome of mutual collisions between (porous) impactors in order to expand the applicability of the code and include the effect of porous material. This may have a huge impact of the modeling results, as porosity affects the model at many points. Final simulations need to be performed and results can then soon be submitted for publication to a renowned journal.

Personal Benefit

For Mr. Müller personally, his visit in Japan has different effects. First, it is a very

interesting experience to get in touch with a culture that is so different to his “normal” environment. Second, a three month scientific stay in a foreign country like Japan is a strong plus factor in one’s vita that may prove essential for future job applications, no matter if in science, industry, or economy. Third, due to the differences in the education system, the way of a PhD student’s scientific work in Japan is much more independent and less supervised than it typically is in Germany. Thus, Mr. Müller, for the first time in his scientific career, was asked to work with such a degree of independence. On the one hand, this may have slowed down the progress of his project. On the other hand, it can be considered as an excellent preparation for his future work he would not have received in Germany.

Impact on the CPS

The motivation to choose the *CPS* exchange program for this scientific visit is twofold. The first, very pragmatic, reason is, that with Mr. Müller’s participation in the *CPS International School of Planetary Sciences 2009* in January in Kobe already a first contact was given. Second, the widespread connections of *CPS* in Japan promised a fruitful environment for the upcoming project. During his time in Japan Mr. Müller attended several meetings and visited multiple institutes:

- CPS Meeting on the current state and future of research on protostars and protoplanetary disks (Kyoto, September 10 - 12)
- Visit of Prof. Onaka’s group (Tokyo, October 28)
- Annual fall meeting of the Japanese Society for Planetary Sciences (Tokyo, September 28 - 30)
- CPS Grain formation Workshop (Osaka, October 8 - 10)
- CPS Workshop on Icy Moons and Origin of Jupiter and other Giant Planets (Sapporo, November 9 - 10)
- Visit of the *Institute for Low Temperature Sciences* and Prof. Yamamoto (Sapporo, November 10 and 13)
- CPS Impact Collisions Meeting (Sapporo, November 11 - 13)
- Visit of Prof. Arakawa’s laboratory at Nagoya University (Nagoya, November 25)

These occasions could be used to get an insight in the Japanese science society and find possible collaboration partners for future work (see below).

Still, *CPS* is in a stage of establishing. Therefore, it is important to promote it’s work and scientific capabilities as well as it’s networking resources in order to find new collaboration partners and funding sources. With Mr. Müller’s scientific visit a link to the German community has been strengthened and opened for new cooperations (see below). Besides that, within his stay in Kobe, Mr. Müller held a seminar in the course of the *Extrasolar Planetary System (EPS)* TV seminar, held once or twice a month between several Japanese universities. As his talk was given in English, the seminar was — as an exception — additionally

broadcasted to Cambridge, where at the same time the meeting *Dynamics of Discs and Planets* at the *Isaac Newton Institute* took place. Thus, several outstanding researchers from all over the world who were following the seminar in front of a screen in Cambridge could appreciate the network capabilities offered by *CPS*.

This scientific visit is supposed to be a starting point for future collaboration between different *CPS* members and German researchers. For this purpose it is planned to hold a bilateral meeting in September 2010 in Jena, Germany, to bring together different scientists of the different fields and explore possible new and innovative collaboration projects. Mr. Müller will therefore play an essential role in preparing this meeting and furthermore act as a link and moderator for the interaction between the Japanese and the German side until stronger connections between the scientists will be established.