

**Scientific Report
March 2, 2011**

1 STSM data

- COST Action MP0905
- Beneficiary: Schödel Rainer, Instituto de Astrofísica de Andalucía - CSIC, Spain
- Host: Eckart Andreas, University of Cologne, Germany
- Period: 21/02/2011 to 25/02/2011
- Reference: COST-STSM-ECOST-STSM-MP0905-210211-004282

2 Purpose of the STSM

The STSM had a dual purpose, work on common projects, on the one hand, and an editorial/working meeting, on the other hand, in order to prepare the second edition of the book: *THE BLACK HOLE AT THE CENTER OF THE MILKY WAY* by Andreas Eckart, Rainer Schödel, & Christian Straubmeier Imperial College Press, London, 2005 ISBN 1-86094-567-8

Both institutions involved in this STSM participate in the COST Action MP0905 "Black Holes in a Violent Universe". The work described in this report relates directly to COST Action Working Groups 3 "The Galactic Centre" and 4 "Supermassive Black Holes".

3 Work carried out during the STSM and results obtained

Editorial meeting: We have identified and gathered concrete information that will have to be added/updated in the book. For example, we want to include a new section about large scale surveys of the Galactic center as they have been performed by IRAS, Spitzer, 2MASS, SIRIUS/IRSF, or HST. Also, we want to provide more details on the larger scale, particularly the central few hundreds of parsecs, i.e. the nuclear bulge/disk that surrounds the nuclear star cluster. Other sections that need more detailed discussions and must be updated urgently are the sections on the short-timescale variability of Sagittarius A* and star formation near the black hole. The general focus of the work packages for the authors will be: Sagittarius A*: Eckart, nuclear star cluster/near-infrared observations of stars: Schödel, preparation of figures and technical support: Straubmeier, instrumentation: Straubmeier and Eckart, interstellar medium: Eckart and Schödel.

Scientific work: Prof. Eckart's student N. Sabha has started working on new large-scale mid-infrared imaging observations of the circumstellar disk/mini-spiral region in the Galactic center as well as on the Arches and Quintuplet regions. R. Schödel discussed with her the scientific implementations (new detection of hot, massive and therefore young stars near the circumnuclear disk) and technical questions (support in removal of patterns on MIR detector). Prof. Eckart's student R. Buchholz works on polarimetric observations of stars in the central parsec. R. Schödel provides support in deconvolution and PSF fitting techniques as well as advice on photometric calibration and interpretation of the measurements. Results obtained show that the region immediately surrounding the black hole is affected primarily by polarization from ISM along the line of sight, while a few arcseconds to the east and west of Sagittarius A*, local ISM near the Galactic center induces polarization via absorption of stellar light. Intriguingly, the polarization to the east of Sagittarius

A* indicates a NS-aligned magnetic field, compatible with alignment of field lines in the northern arm of the mini-spiral. Finally, we discussed lightcurves of Sagittarius A* and their interpretation via relativistic effects on clumps of emitting plasma near the event horizon (A. Witzel, A. Eckart, R. Schoedel) as well as new constraints on the mean emission of Sagittarius A* in the infrared (A. Eckart and R. Schoedel).

4 Future collaboration with the host institution

We will continue our long-term collaboration. R. Schoedel is part of the SOC of a conference prepared by the University of Cologne (AHAR2011 - The central Kiloparsec in Galactic Nuclei). A further visit of either A. Eckart in Granada or R. Schoedel in Cologne is foreseen before the end of 2011.

5 Foreseen publications related to the STSM

Before the end of the year, we plan to have submitted and/or accepted several publications related to this STSM:

- Polarimetric measurements of stars near Sagittarius A*: R. Buchholz et al.
- Analysis of variability of flux and polarimetric parameters in lightcurves of Sagittarius A*: G. Witzel et al.
- New constraints on mean infrared emission of Sagittarius A*: R. Schoedel et al.
- Mid infrared observations of the mini-spiral and circum-nuclear disk region: N. Sabha et al.

A. Eckart and R. Schoedel will be co-authors on all these publications.