

## Research Report

### ICRR Inter-University Research Program 2019

Research Subject: E02 - Search for Dark Matter in the Galactic Centre with MAGIC and CTA-LST1
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Participating Researchers: Masahiro Teshima Yusuke Suda Tomohiro Inada Yoshiki Ohtani Yukiho Kobayashi Daiki Hashimoto
Summary of Research Result :  <p>The grant “E02 - Search for Dark Matter in the Galactic Centre with MAGIC and CTA-LST1” served as starting point to organize the international symposium “Dark Matter searches in the 2020s – At the crossroads of the WIMP” on future Dark Matter (DM) searches at ICRR.</p> <p>The symposium took place from November 11 to 13 at Kashiwa Research Complex. It gathered leading Japanese researchers on collider, direct, and indirect DM searches as well as DM theory. Also, several highly distinguished international researchers joined the symposium. In the Scientific Organizing Committee, various Japanese research institutions were represented (University of Tokyo, Kobe University, Ibaraki University, IPMU), with a leading role of ICRR.</p> <p>The symposium was attended by 112 participants, including 22 invited speakers (with two remote talks). Additionally, eight contributed talks were given by PhD students and young postdoctoral researchers. Also, eight poster presentations were provided. Out of all participants, 25 people (22%) arrived from abroad: The most abroad participants had their home institution in the United States of America (4), Germany, China, the Netherlands, and the Russian Federation (2 participants each). 34 undergraduate students (PhD not yet finished) participated. The overall gender ratio was twelve females to 100 male participants (11% female). Among the invited speakers, 27% were female (six female speakers).</p>

A major aim of the symposium was to raise the interest in DM topics below young students. Therefore, financial support was provided to four talented students and young Postdocs, partially covered by the E02 ICRR Inter-University Research grant.

The symposium focused on WIMP DM models, including dedicated focused sessions on the neutrino floor in direct DM searches, and DM searches in charged cosmic rays. In the theoretical part, latest knowledge about DM particle physics models was reviewed and it was shown that supersymmetric and generic weakly interacting particles have not been ruled out yet. In the following presentations of direct detection experiments, latest limits of current experiments were reported and outstanding sensitivities projected for the future. While these also allow a potential detection of the solar neutrino floor, dedicated talks addressed the issue of how to treat this additional background for DM searches. Current and future collider searches were presented, and the need for complementary direct and indirect measurements was stressed for a DM identification in potential collider detections. Astrophysical, indirect DM detection endeavours show large improvements to achieve with next-generation DM searches, especially the Cherenkov Telescope Array (CTA). It was finally concluded that confirmation of a DM identification and investigation of its particle physics characteristic will be only achieved in synergy of the various research fields. A follow-up symposium is planned in late 2020 or 2021.

All information (participant list, all presentations and summary closing remarks) is archived on a public Indico page at ICRR: <https://indico.icrr.u-tokyo.ac.jp/event/259/>

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