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## Diversity and inclusion activities in Belle II

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### Abstract

These proceedings accompany the Belle II talk in the Science in Society parallel session delivered during Lepton Photon 2021. In this talk we present updated membership statistics using 10 years of data with a diversity and inclusion lens, and we present Belle II's most recent activities to aid and improve diversity and inclusion. This report has the intention to bring light to the social working environment and population representation within our collaboration and, by extension, within high energy physics.

Belle II is a particle physics collaboration that has over 1000 people from institutions in 26 countries who work together to achieve its physics goals. Belle II is committed to fostering an open, diverse, and inclusive environment; as part of this commitment it created a diversity office to raise awareness of diversity and inclusion issues, promote an inclusive atmosphere within the collaboration, provide a safe and confidential point to contact for collaborators to report any issues, particularly those related to discrimination and harassment, and ensure that persons from underrepresented groups are considered for positions of responsibility within the collaboration. Diversity and inclusion activities and initiatives at Belle II and analysis of the demographics of the collaboration will be presented.

Keywords: Belle II, Diversity, Inclusion, Equity, Lepton Photon

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## Introduction

Belle II is a high energy physics collaboration located in Tsukuba, Japan. Belle II is the particle detector at the collision point of the asymmetric  $e^+e^-$  SuperKEKB accelerator. At the end of the 2021 Japanese fiscal year (JFY), Belle II had 1120 active members registered spread over 4 continents. This paper will introduce the Belle II collaboration and the efforts to research and improve on diversity and inclusion within the collaboration. Section 1 will present the statistics collected from the collaboration's membership registrations. Results were first presented at ICHEP2020 [1], which included insights into the first Belle II membership survey taken in 2018. The reader is directed to those proceedings for more information on the survey. Belle II has the intention to conduct the next membership survey imminently.

Section 2 will exhibit some of the actions Belle II has been taking, and will take, to promote diversity and inclusion.

## 1. BELLE II COLLABORATION DEMOGRAPHICS

This section utilises data from 10 years of Belle II registration data from the Belle II member registration platforms from 2011 - 2021. This data is studied with a diversity and inclusion lens, with a particular focus on gender representation due to the data available for analysis. In 2017, Belle II migrated from a previous system, maintained by the Belle II secretariat, to the Belle II Membership Management System (B2MMS), maintained by Belle II Collaborative Services. Due to this migration, results for 2017 may appear anomalous and should not be taken as indicative of real trends.

Within the B2MMS, it is required that a member submit their name, title, gender, email, institution and membership category (i.e. Ph.D. student, faculty, etc.) to register as part of the Belle II collaboration. As of January 2022, gender is no longer required to be defined as either 'Male', 'Female' or 'Other'; an option for the field to be left blank has been added to allow members not to disclose their gender. Here we acknowledge that this does not allow non-cisgender members to specify their gender if they wish to, and possible solutions to this will be discussed at future diversity and inclusion meetings. This form of data taking biases data and can make it hard for non-cisgender members to feel welcomed into our community before they have even officially joined the collaboration. Currently no member has declared themselves as 'Other' in the B2MMS. If there are indeed non-binary Belle II members, this lack of declaration indicates difficulties in gender affirmation within the workplace or due to legal reasons.

Additionally, in the following figures there is an 'unspecified' category; this is a relic from the 2017 changeover of systems where the gender field was empty in the pre-B2MMS system. In the following histograms it is necessary to combine 'other' and 'unspecified' into one category as underrepresented persons are identifiable due to low statistics. We as a collaboration will maintain and pursue true anonymity of our membership data.

Between the years 2011 to 2021 the number of total members at Belle II has approximately tripled. In only 10 years, the proportion of female-identifying members has approximately quadrupled from 57 members in 2011 to 201 members (Figure 1). However, the percentage of female-identifying members within the collaboration is still only increasing at an average of 0.57% each year (calculated from the overall percentage increase of 5.7%, from 12.2% to 17.9%). In comparison to the ICHEP2020 reported rate of 0.4%, Belle II is moving in

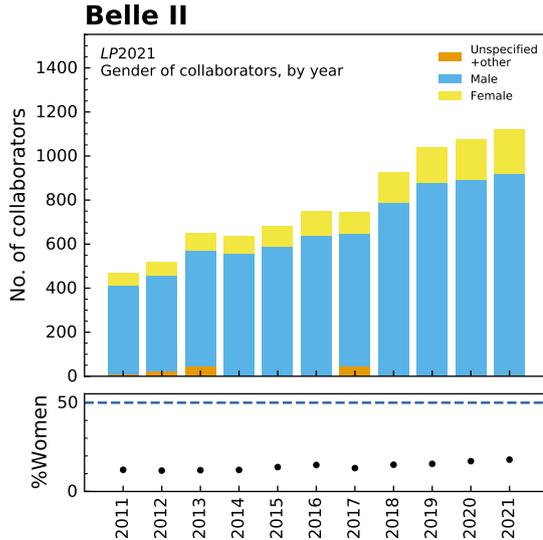


FIG. 1: The number and gender of Belle II Collaborators, from years 2011 to 2021. Data taken from Belle II membership declaration, where ‘other’ refers to non-binary gender identity and ‘unspecified’ refers to undeclared gender information.

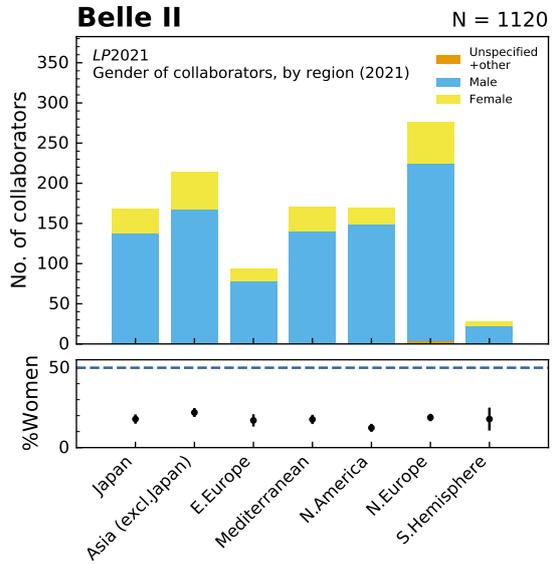


FIG. 2: The number of collaborators of the Belle II Collaboration by region and gender.

the right direction with an increase in rate of the number of female-identifying members. However this is insufficient as, at this rate, Belle II would only reach parity in 2078. 56 years is beyond the predicted lifetime of the Belle II experiment.

We next compare the gender of collaborators by region they work in, based on their registered institution. When compared to similar graphs produced by the ATLAS Collaboration [2] we see that we have a much larger proportion of collaborators from Asian institutions than ATLAS. Japan alone contributes 15.00% of the collaboration, so is separated from the ‘Asia’ region for clearer presentation. One particularly interesting observation can be taken from Figure 2, through the comparison of regions with approximately equal numbers of members and therefore similar representation within the collaboration. Comparing Japan, which represents 15.00% of the collaboration, to Northern America which represents 15.18% of the collaboration, we can see that Japan has a higher representation of women than Northern America, almost 17.86% compared to 12.35% respectively. Within Belle II, the representation of women as a percentage drops as their careers progress from postgraduate to permanent faculty, shown in Figure 3. The under-representation of women increases as their career progresses from postgraduate to permanent faculty. This effect is likely influenced by the age of members who are in their later career stages. The increase in percentage of people who identify as underrepresented minorities in science has been gradual over the last few decades. Though this effect may exist at Belle II, we are not entirely exempt from the coined

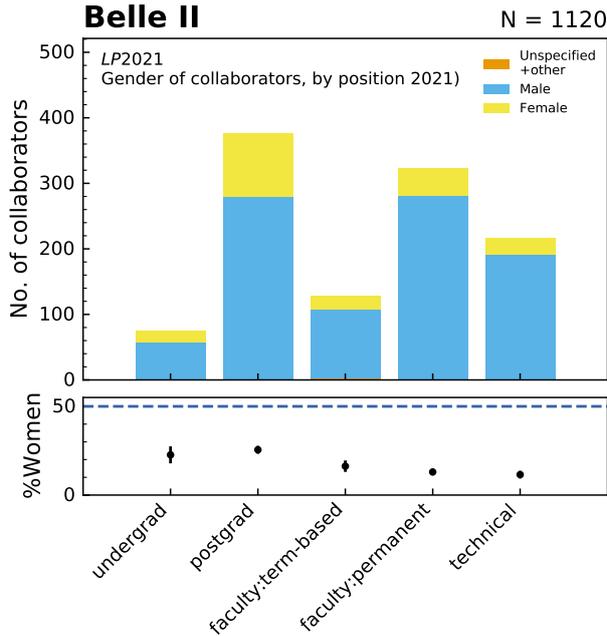


FIG. 3: The number of collaborators of the Belle II Collaboration by position and gender.

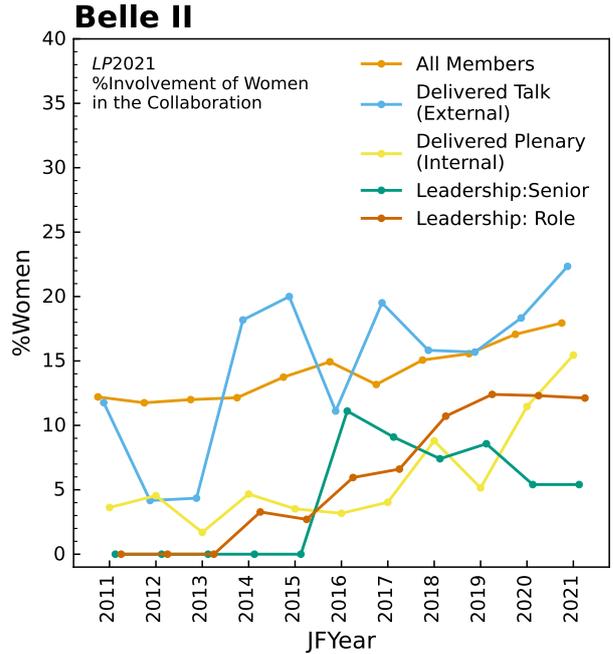


FIG. 4: The percentage of people in the specified roles or recognised involvement who identify as women.

(and passively termed) ‘leaky pipeline’ effect, as there is a drop in gender representation at the permanent faculty level.

Figure 4 shows the percentage of women in recognized involvement in the collaboration by year. The figure shows an upwards trend over the last 10 years of data collection, but leaves a lot of room for improvement. Internal talks are often given by those in leadership roles such as group chairs. These positions have a low percentage of female representation, therefore the fact that there are even fewer women doing internal talks is not surprising.

## 2. BELLE II DIVERSITY AND INCLUSION ACTIONS

Having a large, culturally diverse collaboration has led to Belle II establishing a code of conduct. Belle II included the first iteration of the code of conduct in the Belle II bylaws in October 2017 and then updated them in 2018. More details can be found in Reference [1] and on the Belle II diversity webpage [3].

Belle II uses its active social media platforms to raise awareness of diversity and inclusion events such as International Women’s Day, LGBTSTEM Day, and Colour Blind Awareness Day. The posts are always published in both Japanese and English. In 2019, Belle II became an official supporter of LGBTSTEM Day, through unanimous endorsement of our Institutional Board. Belle II changes its profile picture for the day to a logo with an LBGTQ+ rainbow flag background, and also makes a skin available for profile pictures on Facebook. We encourage other research institutions to support each LGBTSTEM day.

Belle II has been working on other new projects, some of which shall be mentioned as follows. Belle II has been improving certain language used in computing and physics. In

general, we wish to avoid anything that might cause distress or feelings of exclusion to our collaborators. In particular, words with severe racial overtones are either already phased out or in the process of being phased out. Additionally, the Belle II eCafe project has just begun; an initiative in which junior researchers have a biweekly space to chat to peers and discuss issues with the diversity officers. Belle II has also implemented colour blind friendly screens in the experiment control room; analysts and users are encouraged to use colour blind friendly colours in plots and all plots in this conference note have adhered to these schemes. Finally, a gender neutral accessible bathroom has been constructed near the Belle II control room.

We will continue to work within the collaboration, normalizing making things accessible, fostering an inclusive work environment and providing services that encourage diversity, equity and inclusion. We wish to hold ourselves accountable, and aim to provide regular updates on this work and on our statistics. Previous reports are available: EPS 2021 [4], and ICHEP 2020 [1]. We thank the Belle II Secretariat, Belle II Collaborative Services, and the Belle II Speakers Committee for their invaluable assistance and for maintaining Belle II membership and conference statistics.

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