

Analysis on ILC as a Global Project

The first report to ICFA by
the IDT International Expert Panel*

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1 Introduction

This is the first report of the International Expert Panel (IEP) analysing the situation of the International Linear Collider (ILC).

To support the Japanese high energy physics (HEP) community proposing to host the International Linear Collider (ILC) in Japan as a global project, the International Committee for Future Accelerators (ICFA) set up the International Development Team (IDT) in 2020 with a mandate to pave a way towards the preparatory phase of the ILC realisation. In 2021, IDT made a proposal for a preparatory laboratory with a headquarters in Japan to execute engineering studies needed for the construction and to support intergovernmental discussion on the governance, organisation and share of cost and responsibilities. It was hoped that creation of a preparatory laboratory could be triggered by the expression of interest in hosting ILC by the Japanese government. The Ministry of Education, Culture, Sports, Science and Technology (MEXT), after receiving a report from its advisory panel on ILC, concluded in early 2022 that it was still premature to create a preparatory laboratory coupled to the Japanese government expressing its interest in hosting ILC.

ICFA has on various occasions conveyed the importance of the Japanese government expressing an interest in hosting ILC for moving forwards. A general perception shared internationally has been that the Japanese government had to move first in order for other countries to start considering their participation in the ILC project. On the other hand, the Japanese government has been stating its position that such an expression could not be made without some prospect for sharing the cost and responsibilities with other countries. This was considered as one of the key factors that led to the MEXT conclusion on the proposal for a preparatory laboratory.

IEP was set up by IDT in 2022 with endorsement by ICFA to analyse the cause of the current ILC situation with the issue of international participation and to seek a way forward. At the same time, the ILC Technology Network (ITN) was also endorsed by

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ICFA to execute time critical work packages. Those work packages have been selected by the IDT Working Group 2 (accelerator) from the proposal for the preparatory laboratory. Many of them are also relevant for general advancement of accelerator technology. ITN is an international cooperation based on bilateral agreements between KEK and partner laboratories worldwide, which will gather resources to achieve common goals.

In the rest of document, IEP reports its current understanding of the ILC situation and reflections.

2 Analysis on the ILC situation

Under ICFA guidance, ILC was launched as a joint effort of the three precursor linear collider projects, JLC/GLC (Japanese HEP community/Asian Committee for Future Accelerators), NLC (SLAC) and TESLA (DESY), as a global project without predefined site or host. Since they were based on different RF-cavity technologies, the project started with a technology choice guided by an international committee of experts. After selecting superconducting RF-cavity technology in 2004, an international team from laboratories worldwide, the Global Design Effort (GDE), proceeded to produce a Reference Design Report (RDR) followed by a Technical Design Report (TDR) in 2013. Just before completion of the TDR, the Japanese HEP community proposed that Japan host ILC as a global project. The world HEP community continued its technical work. The Japanese HEP community formed a committee of experts to find a candidate site in Japan and selected a mountain region of Kitakami in the Tohoku area that is in the north of the Japanese Main Island. The selected candidate site was judged as suitable by the international Linear Collider Collaboration in 2013. Geological studies have been conducted with the support of the local authorities.

Through FALC, Funding Agencies for Linear (later changed to Large) Colliders, funding agencies of laboratories participating in the GDE work provided resources for the RDR and TDR activities. However, there has been no regular collaborative discussion at a governmental level to advance the realisation of ILC, such as achieving in-principle agreements on the project definition, governance model, and organisation. Such items may need resolution before the intergovernmental negotiation for sharing of the required resources and responsibilities, including the host and site issues, can commence. Other global projects, namely ITER and SKA were launched successfully, although the two had different starting points. ITER was triggered through presidential level discussion between the US and Soviet Union, and a scientific-community initiative started SKA. In both cases, there were governmental groups who followed the progress of the community effort and prepared the political processes necessary for establishing the projects.

The Japanese HEP community initiative to seek the Japanese government declaring its interest to host ILC in a Japanese site as a global project has been supported by a bipartisan Federation of Diet Members for ILC. Some of the members expressed their strong support to the HEP community and public. Assemblies of Japanese corporations have also joined to promote this initiative, as well as the local governments in the region of the candidate site. In the Japanese academia, there was no broad consensus. Ob-

serving those phenomena, the international HEP community thought that the Japanese government would take the initiative to declare its interest to host ILC in Japan and to invite other countries to join. In 2019, the Japanese government expressed its interest in ILC itself but did not refer to hosting. Interaction with MEXT indicates that the Japanese government regards the selection of the host and site to be made as a part of the intergovernmental decision-making process of a global project.

It seems that potential major international partners expect the Japanese government to take the initiative for starting intergovernmental discussions. This might be due to the fact that past international HEP energy frontier colliders started as single-laboratory projects. Each remained a project of the host laboratory, although some of them were supported by international efforts. Notable examples are HERA at DESY and LHC at CERN.

A common understanding between the Japanese government and foreign partners on the process to realise ILC as a global project is necessary for progress. There is currently no forum for potential partner governments to interact regularly in the current ILC framework and where discussions on this subject could be held.

3 Reflections

In contrast to how energy frontier accelerators have been constructed up to now, a global project requires conducting worldwide collaborative discussion at a governmental level. Such discussions could lead to an optimised deployment of resources available on a global scale and enable the construction of large scientific facilities while maintaining the full breadth and diversity of the field.

ILC has been launched and developed globally by the HEP community without regular intergovernmental discussion to share a common understanding of the process to realise it as a global project. Establishing a common view on the principles of such a global project should be the next step to moving forward. In this context, the recently started ITN could provide a vehicle for enabling funding agencies to interact on a regular basis. Such interactions could help to establish a forum for intergovernmental discussions toward the next steps.