

Director's Corner

23 July 2009



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Accelerator Design and Integration: Considerations for distributing high-level RF power for a single tunnel configuration

The main thrust of our ILC accelerator design work during the Technical Design Phase (TDP-1 and TDP-2) is to refine the design presented in the *Reference Design Report* (RDR) towards a more coherent concept, and one that is better optimised for performance to cost to risk. Our approach is to study a set of carefully chosen potential changes to the RDR baseline aimed at producing a new baseline next year as the final milestone in TDP-1. The new baseline will then become the basis of the technical design (TDP-2) that will be completed and documented by the end of 2012. One of the most complex and difficult changes under consideration is changing from the RDR's double-tunnel to a single-tunnel configuration. A key problem to solve for a single-tunnel configuration is how to deliver the high-level radiofrequency power (HLRF) to the cryomodules. There are two very different

solutions being proposed, and the choice between them may be site dependent.

A primary motivation in considering a single underground tunnel for the main linac and associated beamlines is the potential large cost savings realised by eliminating an entire 30-kilometre-long underground tunnel. However, removal of the second (service) tunnel requires us to revisit the original reasons we chose a double-tunnel solution for the RDR: concerns about availability and safety.

The double-tunnel configuration provided us with a conservative solution for the RDR, since access to klystrons, modulators, electronics and other hardware during beam operation improves availability, and escape routes from one tunnel provide straight-forward safety solutions. Nevertheless, the potential savings for a single-tunnel configuration could be more than 100 million dollars, even including anticipated extra costs to achieve good availability and safety solutions. For this reason, we have always planned to come back to study the single-tunnel configurations. One of the primary goals of the present study is to quantify the potential savings and to present realistic concepts for single-tunnel configurations.

Safety is a difficult issue to plan for without a specific site to know local conditions and safety rules, since an acceptable safety scheme may differ for different sites. We are therefore carrying out studies to determine single-tunnel safety solutions for our full range of potential sites. If we adopt a single-tunnel baseline for the TDP-2, we must recognise that the final tunnel configuration will depend on the chosen site and the preference of the host country. The *Technical Design Report* (TDR) information, along with the RDR double tunnel study, will enable an informed analysis of costs and trade-offs, giving a realistic starting point for the host country.



The ILC Reference Design uses a double-tunnel configuration with the klystron high-level RF system in an accessible service tunnel.

