Report of the LCPAC 2006

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Introduction

In the opening address M.Kobayashi, the Director of IPNS, welcomed and thanked the members of the committee for their participation.

The charge to the committee is:

KEKB/Belle

- Review the physics results from Belle and comment whether the physics topics are appropriately covered. Also, comment on the proposed data taking at Y(5S).
- Evaluate the progress of the upgrade of the KEKB machine and Belle detector.
- Evaluate physics program and R&D status of the proposed SuperKEKB.

ILC

- Review the progress of ATF and STF, and give suggestions to the following critical R&D items.
    - Fast Beam Kicker of the ATF which has impact on the ILC Damping ring design.
    - TESLA type cavities and the LL type cavities.
- Review the ATF2 construction plan, where various beam diagnostic devices will be studied.
- Review the STF construction plan, especially whether the STF should be equipped with the capability to make a system test with the electron beam from the early stage of the STF phase I.

Committee Report

Physics results from Belle and running on Υ(5S)

The generation of fermion masses and family replication represent core mysteries of the Standard Model (SM). Those mysteries are at the basis of flavor dynamics and can be studied there. Such studies in kaon systems had actually been instrumental in the development of the SM. History might repeat itself on a deeper level. The high-energy physics community is looking forward to the start-up of the LHC running with the greatest excitement, since by and large it expects that experiments performed there will manifest the existence of physics beyond the Standard Model. To identify the salient features of such anticipated New Physics – for example to infer which of the many different supersymmetric scenarios is realized in nature – it will be important, maybe even essential, to analyze the impact of the New Physics on flavor dynamics.

The Belle collaboration has already made truly historic achievements in the area of quark flavor physics and has established itself as a world leader in an important area of high- energy physics. The original goal of the *B*-factory experiments was to discover the first CP violation outside the neutral kaon sector and test the Kobayashi–Maskawa mechanism quantitatively by combining kaon data and several *B* decay modes. By the last LCPAC meeting, the Belle collaboration had successfully established CP violation in $B \to J/\psi K_S$ together with BABAR, and discovered direct CP violation in $B \to \pi\pi$ and $K\pi$. These discoveries have validated the Kobayashi–Maskawa mechanism as a *tested* theory. Belle also had discovered the important rare decay mode $B \to K/K^*ll$ and presented the pioneering measurement of the lepton spectra. It has analyzed a host of $b \to s$ transitions, which provide tantalizing, though not conclusive hints of New Physics.

This year, the collaboration has presented another impressive array of new physics results. They have observed $B \to \rho/\omega\gamma$ for the first time giving a new measurement of V_{td}. They found another direct CP violation in $B \to K\rho^0$, and measured the forward-backward asymmetry in $B \to K^*ll$, a sensitive probe to New Physics. They have improved measurements of CP asymmetries in $b \to s$ transitions, which still represent a 2.6 σ discrepancy from the standard model when combined with BABAR's results. In addition, they have found new hadronic states, some anticipated, some totally unexpected. All in all, the collaboration continues to produce extremely high quality physics results.

The Committee was pleased to learn that Belle and KEKB were given the S-rating, i.e. the highest possible rating, by the Council for Science and Technology Policy for two consecutive years. It is clear to the Committee that the honor is well deserved and it applauds the collaboration and its leadership. The success of the KEKB program confirms KEK as a world-leading laboratory in high-energy physics. The unique opportunities for studying fundamental physics offered by Belle have attracted strong foreign participation, and the collaboration has maintained its strength well.

We commend the KEKB team for having achieved an integrated luminosity of 0.5 ab^{-1} and having established a clear path towards ~2 ab^{-1} on the $\Upsilon(4S)$ resonance with the existing setup. It was noted that most of the Belle analyses are still very much statistics limited. Like last year we urge the laboratory to achieve at least this sample size. For it would allow not only more precise measurements of reactions studied before, but even more importantly provide the gateway to new types of analyses -- like studies of the lepton spectra in $B \rightarrow K/K^*ll$ (including forward-backward and CP asymmetries), analyses of individual $b \rightarrow s$ channels, high sensitivity searches for flavor- and CP-violation in charm and τ decays.

While a clear priority must be given to the running at $\Upsilon(4S)$, it should not be forgotten that Belle, in combination with high luminosity and energy versatility of KEKB, provides excellent opportunities for other physics items. The collaboration presented some preliminary results from a short test run at $\Upsilon(5S)$ of 1.86 fb^{-1}, where the machine could deliver luminosity comparable to that at $\Upsilon(4S)$. They have shown that the B_s mesons are produced predominantly in B_s^* B_s^* pairs with a cross section of approximately 0.05 nb. The collaboration proposes to accumulate 50 fb^{-1} of the $\Upsilon(5S)$ resonance in view of extending B_s studies including the possibility to determine $\Delta\Gamma$ with an error of 20% from branching fraction measurements and to search for rare decays such as $B_s \rightarrow \gamma\gamma$. In addition, a brief run on $\Upsilon(3S)$ was also performed, which is expected to provide an interesting new limit on a relatively light dark matter particle that cannot be probed by direct detection in underground experiments.

Although the collaboration has not yet demonstrated the physics reach, the Committee endorses the idea to accumulate about 50 fb^{-1} $\Upsilon(5S)$ data provided it does not compromise the baseline physics at $\Upsilon(4S)$. The decision on the data-taking schedule must be left to the collaboration so that they can optimize their physics program. It must be noted that even a small amount of data would allow a determination of absolute branching ratios of exclusive as well as inclusive channels (like $B_s \rightarrow l\nu X$) that cannot be achieved any other way and that will be important for a host of future studies. At the same time the committee asks Belle to consider the potential for an extended $\Upsilon(5S)$ run in the future, and analyze in detail what kind of sensitivities it could achieve concerning rare B_s decays and CP violation.

<u>KEKB Accelerator</u>

The Committee heard a presentation from Andrew Hutton, Chair of the KEKB Accelerator Review Committee, on the conclusions made by the ARC, which met immediately before this meeting. It also heard a series of reports from the KEKB accelerator staff on the progress made during the past year, particularly on the crab cavity program. The Committee thanks KEKB team as well as the ARC members for their efforts.

During the past year, KEKB once again reached another record peak luminosity. At this very high level of performance, there are indications that the KEKB collider has been approaching its actual performance limitations, as evidenced by a slowing down of its rate of luminosity improvements. In addition, there seems to be considerable difficulty to maintain peak luminosity once it is achieved, indicating that the accelerator is becoming less robust against small perturbations. Part of that loss of robustness could be attributed to the initial implementation of the crab lattice, and/or to the simultaneous attempt to shorten the bunch spacing. The Committee recommends that a systematic study be carried out to understand the cause of the loss of robustness, and to possibly cure it accordingly.

Given the apparent saturation of the luminosity level, and given the fact that KEKB has already been pushed far beyond its expectations, the Committee notes that the single most prominent source of a substantial luminosity improvement (about a factor of 2) to be explored next is the crab cavity scheme.

At present, the two crab cavities to be installed in the two rings have been vertically cold tested and their performance is satisfactory. However, a mechanical problem was encountered in inserting the long coaxial power couplers. The ARC has reviewed in detail this technical problem and has suggested that it can be solved by an improved assembly procedure, which does not require a modification of the original design**.
The laboratory should make every effort to provide the resources toward the successful installation and commissioning of the crab cavities this summer. The Committee wishes to point out again that this is a critically important program, which has far reaching implications beyond KEKB.

** The KEKB crab cavity team has since the LCPAC meeting succeeded in assembling the crab cavity. The Committee congratulates the crab cavity team for this important progress.

The Committee learned further that the KEKB operation budget will be reduced in JFY2006. The Committee suggests that the KEKB operation be protected in such a way that the crab cavity program is allowed to reach a definitive conclusion. In this regard, the Committee was pleased to hear that the KEK management would try to absorb the necessary budgetary impact in case some unforeseen technical problems of the crab cavity arise.

Belle Detector and Computing Upgrades

With the installation of crab crossing, the instantaneous luminosity is expected to double. Therefore, in order to maintain efficiency as the luminosity increases, Belle is undertaking several upgrades of its detector, data acquisition and trigger over the next few years.

At the current luminosity, SVD and CDC are running without any degradation due to radiation. The effect on TOF is also minimal. In addition, the higher rate due to neutrons in KLM was reduced to 1/3 by inserting polyethylene sheets. The Belle group has good understanding on the trigger and rate dependence on the beam current and luminosity, and thus has a reliable estimate on the data and detector quality at higher luminosity runs.

Following the LCPAC recommendations made last year, the Belle group started upgrading detector components critical for the coming high luminosity runs. This includes:

- replacing SVD readout chips for the inner two layers with the APV25 which has 16 times shorter shaping time than the current chips,
- switching to pipeline readout for TOF counters, EFC, CDC, KLM, TRG, etc.,
- L0 trigger and DAQ upgrade, and
- computing environment upgrade.

The detector upgrade projects have been moving forward at a good pace, and most of them should be able to be installed by summer 2007.

In recent high luminosity runs, deadtimes (typically 10%) have occasionally been as high as 30% and there appears to be a wall or non-linearity in the system. Belle is moving to a more fully pipelined system based on a common readout platform, called COPPER, and a standard detector interface card called FINESSE. This seems to be an efficient way to proceed. The Silicon Vertex Detector has to be handled differently and here Belle is borrowing from CMS the front readout chip, the APV25, which provides waveform sampling and should solve occupancy and deadtime issues. The timing system is being redone to support the pipelined architecture. The event builder and the data recording system are being modified as needed. New trigger algorithms are being implemented. New data quality monitoring software is being written. These changes are being made as needed to minimize the disruption to the ongoing program and to best use scarce resources. We expect them to enable Belle to maintain its efficiency and data quality for the foreseeable future.

As its dataset has increased, Belle has had to adopt new approaches to computing in order to analyze and publish its data in a timely fashion. It is worth noting that most of Belle's computing needs are connected to analysis and not to primary event reconstruction. Recently, Belle has switched its computing platform from workstation and server machines running the SOLARIS operating system to commodity INTEL-based PCs running LINUX. While the new platform is not expected to be as robust, this is more than compensated by the much lower cost per CPU cycle. Belle has also changed its data storage and access scheme from a largely tape-based system to a hierarchical storage management system using both tapes and large amounts of disk for caching frequently used datasets. This should improve the speed with which Belle physicists can access the data. The new systems are inherently extensible and will facilitate future upgrades. These approaches are now common throughout high-energy physics so the risk of adopting them is very low.

With the increased computing capability, Belle is considering reprocessing all or most of its dataset to take advantage of algorithm improvements in several areas. This seems like a good time to do this. The reprocessing will not take long. Belle is working with INTEL to understand how to optimize its code for the new generation of processors. A collaborative relationship with a key vendor can only be a good thing. Finally, Belle is investing in GRID-enabled software. In general, Belle is responding well to the challenge of increasing luminosities and now has a platform that should allow it to continue to do so for several years.

The Committee recommends pushing the detector and computing upgrades as planned, to collect and analyze data in the coming higher luminosity runs with even higher efficiency and quality.

SuperKEKB Accelerator

Much effort will be needed to upgrade KEKB to accomplish the SuperKEKB goals. The beam currents will be 9.4 A in the HER and 4.1 A in the LER. Bunch length and beta-function at the interaction point are both to be compressed to 3 mm. The RF system will need a serious upgrade, including larger coupling cavities for the ARES cavities. The HOM dampers of the accelerating superconducting cavities and of the crab cavities will need to be redesigned. The former ones will absorb up to 60 kW in vacuum. The vacuum system will need to be completely replaced. A 1-GeV positron-damping ring will be added to bring the injection noise under control. New interaction region magnets will be installed closer to the IP. Background will increase by approximately a factor of 20. The effect of reducing the SVD beam pipe radius from 1.5 cm to 1 cm needs evaluation.

The Committee was pleased to learn that valuable R&D work in view of the SuperKEKB accelerator has progressed significantly. In addition to the high priority work performed for the crab cavities, the following items necessary in view of the planned increase of the beam currents are being addressed:

- a vacuum beam pipe with two antechambers, cooled bellows and flanges of a new design has been installed in the LER wiggler,
- high-power input couplers for the ARES cavities have been developed and built,
- RF loads for absorbing large HOM power have been designed and built,
- the design of low-impedance collimators has progressed and a first prototype has been designed,
- a prototype bunch-to-bunch feedback system was successfully tested both in KEKB and ATF,
- a method to monitor BPM displacements resulting from thermal deformations has been designed and tested,
- an instrument for the in-situ measurement of the secondary electron yield of vacuum chamber surfaces exposed to e+ will be operated in 2006 to contribute to the understanding and control of the e-cloud beam instability.

Furthermore in view of the proposed reduction of the vertical beta function at the interaction point, winding and curing of coils for the new SuperKEKB insertion quadrupoles were made.

With respect to last year's recommendations, the Committee notes that the following two subjects could not yet be addressed:

- Charge exchange between the two rings has been proposed as a way to mitigate the electron cloud instability. It should be studied if the fast ion instability will come into play and become the new limiting factor after charge switch.
- Instabilities driven by coherent synchrotron radiation have been identified as a significant potential limiting factor for SuperKEKB. One way to control this effect is to reduce the vacuum chamber radius. Since this would have other negative impacts on the accelerator design, a careful study and an optimized choice are needed.

The Committee does not consider these uncertainties as feasibility issues, but rather, consider them as important optimization issues. These uncertainties have led the design team to define a luminosity range in the letter of intent design. As more knowledge is gained, this uncertainty range will be reduced. Before then, however, it is strongly urged that R&D efforts continue be invested to address these issues.

The Committee has further learned that principle considerations about a SuperB factory based on e+ and e- linacs, a single pass IP and energy recovery have been addressed in the particle accelerator community. The Committee heard a presentation that such a principle scheme bears many technical challenges that require extensive R&D. The Committee considers as a result that at present there is no need to consider changing the present SuperKEKB design from a ring-based to a linac-based concept. It however suggests that the SuperKEKB team follows the evolution of the linac-based concept closely so that its possible future improvements and developments not be overlooked.

<u>SuperKEKB Physics and Timescale</u>

The Committee heard a presentation on the physics case of SuperKEKB mostly based on the Letter of Intent released the previous year. SuperKEKB aims at approximately $4ab^{-1}$ per year of integrated luminosity. The main objective of this large data sample is to elucidate the flavor structure of anticipated new physics at the TeV scale, such as supersymmetry or extra dimensions. In some cases, precision measurements with such a large sample would constrain new physics even beyond 100 TeV, i.e. beyond the reach of the LHC. We find the presented scientific goal exciting, and the physics case would become even stronger once the LHC discovers new physics. We are also deeply impressed by the track record as well as the enthusiasm of the Belle Collaboration in the project.

There are several updates in the physics case this year. For instance, the world average data on the CP asymmetry in the penguin-induced $b \to s$ transitions has approached that of the tree-level $b \to c$ transitions, yet the discrepancy in sin $2\phi_1$ remains at the 2.6 sigma level. To fully resolve this issue, the required integrated luminosity would be even greater than anticipated last year, maybe reaching the several ten ab^{-1} level. At the same time, given Belle's success in the study of a forward-backward asymmetry in $B \to K^*ll$ and various rare decays, the credibility of the collaboration to handle huge data sets is boosted. Moreover, the dramatic success in the continued high-luminosity operation of the current KEKB complex gives the Committee confidence that the KEK accelerator team can take on the ambitious SuperKEKB project.

The Committee notes that KEKB will very likely be the only electron-positron *B*-factory in the world beyond 2008. It is important to exploit this unique facility. The Committee is looking forward to see the performance of the crab cavities that will be installed this summer. It is likely that it will take at least a few months, possibly a year or so, to see the merit of the crab cavities. The collaboration is also looking into the physics reach in other modes of operation, such as running at the $\Upsilon(5S)$ resonance. The proponents of the SuperKEKB project have presented a very broad physics case in their Letter of Intent last year. The Committee would like to hear from them an update concerning the potential of B_s studies from $\Upsilon(5S)$ running and possibly CP studies in τ decays.

The Committee enthusiastically recommends continuing the accelerator and detector R&D so that SuperKEKB can be proposed for construction when the time is ripe. It is anticipated that there will be crucial information on the performance of the crab cavities, evolution of the physics case, as well as the development of the competing SuperB ideas in a year or two, leading to more concrete recommendations on the project. The Committee also encourages the KEK management to continue their support for attracting the international effort on this project.

<u>ILC project</u>

There is wide agreement in the particle physics community that the International Linear Collider (ILC), an electron-positron linear collider operating in the energy range between 90 and 500 (1000) GeV, should be the next project at the high energy frontier in particle physics. Progress towards its realization has been moving at a rapid pace in the last 12 months. The organization for the coordination of the design and the development of the ILC, the Global Design Effort (GDE), has been put in place in March 2005 at the Linear Collider Workshop in Stanford, when B. Barish was nominated as the director. The full GDE team was set up very quickly with roughly equal representation from the three regions. KEK staff is represented very well in this effort, e.g. with F. Takasaki as the Asian regional director of the GDE and K. Yokoya is one of three accelerator experts in the executive committee, which consists, of seven members total, including the Director. The management structure for the KEK activities in the context of the GDE and of the development work in general are now well defined.

The plan and schedule of the GDE foresees the production of a Baseline Configuration Design (BCD) by December 2005, a Reference Design Report (RDR) by December 2006 containing a first cost estimate, and a Technical Design Report (TDR) together with a detailed costing to be completed during 2008. The first milestone was met and the BCD produced on time.

KEK staff is strongly involved in the design and R&D effort for the ILC within the GDE in areas in which they have unique expertise, like in the superconducting technology and in beam dynamics. One example is the leading role of KEK in the design and fabrication of higher gradient accelerating structures. Naturally, KEK has meanwhile joined the international TESLA Technology Collaboration and is an international partner in the US centred Superconducting Module Test Facility (SMTF).

The committee is convinced that KEK can and must play a major role in the world-wide collaboration pursuing the ILC program and strongly endorses this leadership role. As described below, KEK is running the unique accelerator test facility (ATF) and is building the superconducting linac technology test facility (STF). Experiments at the ATF are planned and carried out involving physicists from all regions. ATF2, the extension of ATF is being pursued in international collaboration. The committee strongly supports this international approach to ATF and, in particular, to ATF2. Concerning STF, KEK should identify areas in which common equipment, software tools, and instrumentation can be shared with the test facilities in the other regions. This would allow for a greater ease of exchange of R&D data and for possible cost reduction. The committee would like to stress that having a dedicated test facility such as the STF in the Asian region is mandatory for successful development work and, in particular, for the involvement of industry. Both facilities, the ATF and the STF are vital for the development of the ILC. These facilities and the associated superconducting technology developments are excellent training grounds for students and young researchers.

ATF and ATF2

The ATF is the world's unique research centre for issues concerning injector, damping ring and beam delivery system and continues to provide vital opportunities for the development of the ILC. Last summer the Memorandum of Understanding was agreed upon by a number of institutions in the three regions to define the organization of the international collaboration at the ATF. Now the International Collaboration Board, which consists of a delegate from each participating institute and the three GDE Regional Directors, makes executive decisions and nominates the Spokesperson, currently J. Urakawa of KEK, who coordinates the scientific programs at the ATF. The Technical Board consisting of experts from each of the three regions assists in formulating the Annual Activity Plan and assessing the scientific progress. There were presentations on instrumentation development for high precision measurements of the beam position and profile, high quality beam extraction from the damping ring, the study of fast intra-train feedback and feedforward. The Committee particularly notes the promising results of the study of the fast beam kicker that is critical to the design of the ILC damping ring, and strongly supports its continuation to demonstrate stable and reliable beam extraction. Reflecting upon its potential capacities, the Committee also urges the KEK management to further exploit the ATF.

The committee heard the status and updated plan of the second phase of the ATF (ATF2), which will extend the extraction line of the ATF for the construction and test of a final focus optics system (FFS) that aims to achieve a world record small beam size of 35 nm. The technical details including the schedule, the organization and the budget are summarized in the ATF2 Proposal Vol.1 & 2 that were recently published. The committee is very pleased to see that the ATF2 project has been successfully started as an international collaboration from the beginning with cost and manpower shared by the three regions, providing an ideal model for the ILC collaboration. It must be assured that KEK in its capacity as the host laboratory of ATF2 provides necessary technical and administrative support for the ATF2 collaboration to be successful in completing its ambitious program in a timely fashion for the ILC TDR and the ILC construction, and also in educating young, competent accelerator scientistsCommitee..

STF

The Superconducting Test Facility (STF) and associated superconducting RF developments at KEK are critical components of the ILC program in Asia and the world. STF will allow development of the necessary superconducting accelerator technologies for the ILC in conjunction with industry in the region. Superconducting technology is the backbone of the two 15 km main linacs for the ILC.

The STF facility is being developed in two phases. The first phase, which will be two years in duration, began in 2005 and has been designed to allow the researchers to begin quickly developing high gradient cavities and testing their performance. During this phase, the test facility is being constructed, including an electron beam, klystrons and an RF waveguide system, multi-temperature cryogenic feeds and test instrumentation. In addition, the infrastructure needed to fabricate, process, and vertically test cavities has also been developed. This will include a new, state-of-the-art electro-polishing facility, building on the existing expertise. Cavity development follows two paths, first, a modified Tesla style or baseline cell shape, and a modified Low Loss shape, (first developed at JLAB), called Ichiro. Each cavity contains nine cells. The group plans to construct four modified Tesla style 9-cell cavities, and four high gradient 9-cell Ichiro shape cavities housed separately in two four-cavity cryomodules. Each cavity must be "dressed" with a helium jacket, an input power coupler, higher order mode (HOM) coupler, and frequency tuner. A test station is being constructed to condition the input couplers for high power operation. There are two custom KEK designed cavity tuners, the "ball tuner", which has large dynamic range for high gradient operation, and the "slide jack" tuner for baseline gradients. In addition, piezo-electric crystals are installed with both tuner assemblies in order to allow fast tuning during beam operation in addition to the "slow" motor drives. The motors are located outside the cryostat, unlike the present ILC baseline design.

Very good progress has been made on all fronts. The single cell development work is largely complete and the results are excellent and most impressive. In fact, the world record gradient single cell performance has been achieved by the KEK group, greater than 50 MV/m. The main remaining task with the cell work is to demonstrate a yield of 85%. To date, 50% has been achieved. The first cavities have been assembled and processed and full cryomodule tests will begin in the summer or fall 2006. The most challenging technical aspect of the project is to reliably and consistently process 9-cell cavities which will achieve the desired high gradient. To date, the Tesla style first cavity has been tested, and 19 MV/m was reached, a nine-cell LL-type cavity reached 29 MV/m. This is an excellent start but much more work will be required to accomplish the phase I goal of operating 4 cavities at 35 MV/m and 4 cavities at 45 MV/m for extended periods of time.

The phase two program goal, constructing one RF-unit is essential. The committee encourages KEK to work closely with the world community and attempt to develop common equipment, software tools, and instrumentation with the other facilities being developed in Europe and the Americas.

Beam at STF

As requested, the committee discussed the importance of having an electron beam available for first phase of the STF. Of course, many important tests can be made before beam is available, such as system check out, gradient measurements, cryogenic load measurements, and the all critical dark current measurements. However, the primary purpose of the beam is to test the cryomodule and cavity system under realistic conditions. The beam tests include the study of higher order modes, which cannot be tested in any other manner and an independent and precise check of the accelerating gradient of the cavities. Lorentz force detuning, which is the cavity shape distortion and associated frequency shift due to RF pressure must be compensated by the piezo-electric crystals using a feed-forward technique. These real-time corrections must include beam-loading effects, which are significant. Realistic testing of the low-level RF system, both the electronics which is a modified JPARC design, and sophisticated software, and fast-tuner system, should be tested using a beam with ILC characteristics. The group has developed simulations to help understand the effects on the cavity, which are most severe at high gradient. The frequency shift at 45 MV/m is 3 kHz for the Ichiro type cavity, while the baseline cavity shifts 400-500 Hz. The test beam will also provide a focal point for students to develop the necessary expertise to fully understand the cryomodule in realistic conditions. The committee endorses the need for beam at the first phase of STF.

STF Summary

KEK is naturally the leading laboratory in high gradient cavity development in the world, which follows from their record setting achievements in high gradient single-cell research. The committee considers the goals of STF to be very ambitious and the laboratory will need to strongly support this effort if it is to succeed. The committee fully endorses the importance of this R&D program and recognizes the very high quality of the work and of the researchers. The committee also thinks the laboratory would benefit from a review of the scope of the program. The program is comprehensive and consequently is very broad and the committee thinks that several aspects of the program could be assigned to international partners as in-kind contributions without KEK and its Asian collaborators giving up any of the leadership in high gradient cavity development. It is the success of this unique world-leading high gradient program that will establish the clear leadership of KEK and its Asian partners in superconducting RF development and place KEK in the strongest position to develop a successful bid-to-host the International Linear Collider in Asia.

The KEK activities for the ILC are proceeding very well. The committee recognizes the significant progress since last year. The work at KEK is critical to the world-wide effort in superconducting RF and to advanced accelerator physics development for the ILC in the context of the GDE program. The Committee strongly endorses the leading role of KEK in these areas. It is very encouraging to see the international involvement at KEK increasing rapidly, as evidenced by the global collaboration at ATF2.
The committee recommends a careful analysis and planning of the KEK resources in order to ensure the success of the program.