OPEN SESSION

1. Status of LEP

R. Assmann reported on the status and performance of LEP during the current run. In order to maximise the discovery potential, the operation strategy for LEP in its final year has aimed for the highest possible energy at the expense of reduced luminosity. So far a total luminosity of 114 pb\(^{-1}\) per experiment has been delivered (1.07 pb\(^{-1}\) per day), mainly centred around three beam energies: 102.7, 103.4 and 104.1 GeV. These correspond, respectively, to a margin of 2, 1 and 0 klystron-trips before the beam is lost. Operation with 0 klystron margin at the highest energy results in a typical beam lifetime of 14 min (compared with 1.5 h at 1 klystron margin). To improve luminosity efficiency, LEP has therefore been operated in a 'mini-ramp' mode, where the energy of a fill is progressively increased by reducing the klystron margin in steps from 2 to 0 as the current decreases. Despite pushing LEP to its energy limit, the overall luminosity has been very good, slightly exceeding 1998 performance and only 20% below the record operation in 1999. In addition to high reliability of all the hardware systems, an important factor in maintaining a high integrated luminosity at LEP has been the improvement in turn-around time between fills, which now averages 69 min compared with 92 min in 1999. Thankfully, movements of the LEP ring due to LHC civil engineering have so far been modest and have not appreciably affected operation.

The energy increase since last year of 3.4 GeV (from 101 to 104.4 GeV) is due to improvements in the RF system (1.1 GeV), changes in the RF operational procedures (2.2 GeV) and an increase in the bending length of the ring (0.2 GeV). The sc RF cavities are being operated at an average gradient of 7.4 MV/m, well above their design performance of 6 MV/m. Despite this demanding operation, only 4 cavities have been lost (1 in 1999 and 3 this year).

For the remaining high-energy operation of LEP, a recent short MD has indicated that operation with 2+2 bunches, rather than the present 4+4, results in only a small decrease in luminosity for a large reduction of current. This seems to significantly improve the RF stability and, in consequence, to improve the operation of the LEP at its highest energy near 104 GeV. If this is confirmed with further tests, LEP will be operated in future with 2+2 bunches and ramped to 104 GeV as early as possible in each fill. Depending on the outcome of these tests, the luminosity per day at 104 GeV may be between 0.2 and 0.64 pb\(^{-1}\), representing at least a factor 5 improvement over present operation.

2. LEP detector status reports

OPAL S. Yamashita
ALEPH G. Taylor
DELPHI W. Murray
L3 S. Gentile

All detectors reported successful operation during the present run, collecting about 95 pb\(^{-1}\) at high energy so far. Despite a larger horizontal beam size the machine backgrounds have mainly been good, thanks to optimisation of the optics and collimators by the accelerator team.
The physics results are in agreement with the expectations of the Standard Model, although several interesting channels and events were highlighted. The latter included some excess in the light sbottom channel from ALEPH. In addition, a few high mass SM Higgs candidates were reported around 115 GeV, but these are not statistically distinct from a background fluctuation. Lower mass limits of 108-111 GeV (95% CL) for the SM Higgs were reported—an improvement in mass reach by about 5 GeV since last year.

For the final operation of LEP, all detectors agree that the next priorities are to obtain about 10 pb\(^{-1}\) near 104 GeV for chargino searches, followed by optimisation of LEP operation for the SM Higgs search. Concerning an extension beyond the presently-scheduled shutdown on 15 September, all detectors requested running in the two week reserve until the end of the month. A final 0.5 pb\(^{-1}\) sample of Z calibration data is also requested near the end of the run. In addition, assuming no sign of new physics emerges, three of the four detectors requested an extension of the run into December with LEP operated at 161 GeV total energy, in order to obtain a 200 pb\(^{-1}\) sample for a threshold measurement of the W mass.

3. LEP working group reports

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The search and electroweak working groups reported on the combined results from the run in progress. No evidence of a new physics signal was reported. The combined lower mass limit on the SM Higgs is 113.3 GeV (95% CL). The stau excess observed earlier is not confirmed in this year's data and is now interpreted as a statistical fluctuation.

The combined direct reconstruction measurement of the W mass from LEP is 80.428±0.046 GeV, which is dominated by the systematic uncertainty of 36 MeV. Based on reasonable assumptions of reductions in the systematic errors, the estimated final W mass error is 35 MeV. An additional 200 pb\(^{-1}\) run at 161 GeV would provide an independent measurement with 48 MeV precision which, when combined with the direct reconstruction measurement, would result in a reduction of the final error on the W mass to 30 MeV.

CLOSED SESSION


Apologies: M. Doser, R. Miquel, Y. Sirois.

1. Approval of the minutes of the 54th meeting

The minutes of the 54th meeting (LEPC 2000-2/LEPC 54) were approved without modification.

2. Chairman's report

The chairman announced there will be a final round of status reports from LEP on 5 September, which represents the latest date for the input of new data regarding any possible extension of LEP (to be based on the grounds of a potential discovery). Short presentations from the machine, the four detectors and the Higgs and SUSY working groups will be included. After these presentations the LEP detector spokesmen will meet together with CERN and LEP
management, the LEP coordinator and the LEPC chairman and secretary to decide how to run LEP for the final period.

The chairman invited the LEPC to the LEP Fest, scheduled for 10-11 October, where the latest results from LEP will be presented as well as perspectives on the history of LEP and its contributions to physics and to accelerator and detector technologies. A LEPC working lunch has been arranged during the meeting, on 11 October.

Two further meetings of the LEPC will be scheduled in 2001 (March and November) in order to discuss the physics analysis, detector dismantling and data archiving.

3 . Discussion on the LEP machine report

The chairman joined the LEPC in congratulating the accelerator team for increasing the energy of LEP still further in 2000 while maintaining a high integrated luminosity, despite operating the hardware at its limit. The committee deeply appreciates the high standard of the entire CERN accelerator complex in achieving this performance.

The committee supports the new strategy to operate LEP at a lower beam current with 2+2 bunches if further tests prove successful. Although no further energy increase can be obtained, this strategy may provide a higher daily luminosity at 104 GeV if it indeed leads to improved stability of the sc RF system.

4 . Discussion on the reports from the LEP experiments and LEP working groups

The committee was once again impressed by the quasi real time physics analyses of the LEP detectors and in the fast combined analyses of the working groups. The spirit of openness between the LEP collaborations has been instrumental in the unqualified success of the physics output from the working groups. Although no clear signal of new physics has emerged, some interesting events have been observed and the new data are eagerly anticipated.

The committee strongly supports operation of LEP in the two week reserve until the end of September. This will significantly help to explore the SM Higgs mass window between 113 and 115 GeV. (LEP operation during the two week reserve has now been approved by the Director General; so LEP will run until 1 October.) Concerning the request for an extension of the run to make a threshold measurement of the W mass at 161 GeV, while recognising that the measurement has some aspects of basic interest, the committee considers the resulting improvement of the W mass to be too modest and therefore does not support an extension of LEP for this measurement. Following the original understanding, any extension of LEP beyond the end of September will require a good chance of transforming a significant signal of new physics into a discovery.

5 . Report from the LEP coordinator and planning for the final operation of LEP

The LEP coordinator reported on the progress of the beam energy calibration. Both the NMR extrapolation method and the Qs vs. $V_{\text{RF}}$ method seem likely to reach their precision goals of 20 MeV each. The precision spectrometer (15 MeV goal) has encountered some unexpected systematic errors, whose origin is under study.

So far this year the delivered luminosity has been divided as follows: near to 102.7 GeV (72 pb$^{-1}$), 103.4 GeV (42 pb$^{-1}$) and 104.1 (2.3 pb$^{-1}$), corresponding to 2, 1 and 0 klystrons margin, respectively. The most recent operation suggests that the time spent at 102.7 GeV can be somewhat reduced, so the performance of the present mini-ramp scheme—which is close to ideal for the Higgs search—may be improved.

Following the proposals of the experimental teams and the LEP coordinator, in consultation with the machine team, the committee recommends the following ordered sequence of LEP operations:
a) Operation at the highest energy near 104 GeV for 10 pb$^{-1}$ to optimise the chargino search. This should be done now since the available RF voltage tends to decrease with time.

b) If a signal is observed then continue operation at this energy.

c) If no signal is observed then optimise the operation for the SM Higgs search and continue this way until the end of September (while allowing time for beam energy MDs and 0.5 pb$^{-1}$ Z calibration data).

d) This operation strategy of LEP will be reviewed on 5 September in the light of the new data.

6. Next LEPC meeting

The date of the next LEPC meeting is the LEP Fest, **Tuesday-Wednesday 10-11 October**. Although there will not be a formal closed session, a LEPC working lunch is scheduled for 11 October 2000.

J. Kirkby