CONFERENCE SUMMARY

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So, we come to the end of the meeting, and myself a little out of breath as a matter of fact. We will just reflect for a few moments on what it was we found was going on here and on the pleasure of meeting everyone again in such a pleasant surrounding. As before in these meetings those who have come for the first time, I hope are delighted and challenged by meeting new friends and new ideas; those who have been before have also met new friends and ideas. We have also enjoyed seeing our old friends and the successful development of ideas and dreams that we've had into successful practise. We enjoy the customs and the continuity of our community at the same time that we continue to set new precedents. For example, you could consider the precedent of our good chairman, Dr. Angert, who kindly conceived the idea of having the chairman of the last conference give this summary.

Daher möchte ich nur in Deutsch heute sprechen und Sie verstehen sicher, warum ich in der Sitzung des Organisationskomitees vorschlug, die nächste Konferenz in Japan stattfinden zu lassen.

I explained that I would perhaps continue the summary in German and then pass along this favor to Dr. Angert by suggesting to the Organizing Committee Meeting that the next meeting be held in Japan.

The meeting actually started before Sunday for many of us. Many of us visited your laboratories in Europe, and we want to thank those laboratories for all the hospitality and discussions that we partook of. Last Sunday at the welcome party, already the serious business had begun, discussions already about what's happened since the last time.

On Monday we saw that there was a certain change in the format of the meeting. All of the oral talks were arranged so that there was a somewhat longer time to give more depth on topics which were picked to range across the entire field. We started with a review of proton linac work, which brought home the point that higher intensities and higher duty factor are very much the main interest now, and that improved component technology is providing the path to the desired performance.

We heard about the meson factory in the Soviet Union and the work that's going on very impressively in China. A unique machine was described, a variable-frequency linac with has now been operating very successfuly in Japan. And we have also heard of a very interesting device which is actually a decelerator - a linac post-decelerator. The ions source group is comprised of a very enthusiastic group of individuals who are really making great strides in providing the bright beams that we all now are so interested in. They have organized their own meeting, following this one, and I would like to wish them all success in their deliberations.

One of the main topics of this meeting as of the last conference was the RFQ. We did an experiment on the presentation, and I think it went reasonably well. We expected to hear a lot of information and about even more work during some discussion. There could have been more dicussion, I think, for a long time. We should pay a tribute to our colleagues in the Soviet Union, Professor Kapchinskiy, and his colleague Andreev, who unfortunately didn't join us. We would ask the USSR representatives to take home again our expression of respect to their great development. In the last conference there were 17 papers dealing with the RFQ or related subjects, this time almost 40, plus the discussions and the special session that we had.

What we have seen is the acceleration of beam in many of these devices, and we have seen that the performance agrees with the predictions. This is very satisfying. We saw many people now working on innovations in the RFQ for high current, high brightness, applications where space charge is ~~of~~ strong consideration, CW operation machines that accelerate very heavy ions, and another machine which includes a debuncher section at the end of the RFQ. We saw that problems were solved as they came up. Different approaches have been taken to the tuning; we saw impressive continuing developmental work in the codes that are used to design and describe the performance of these machines. And there is even now some other work in different kinds of circuits including the MEQALAC circuit, which I find very pleasing to see, and I will be very interested to see how these developments are described at the next conference. It seems safe to say now the RFQ is truly our darling. We worried maybe up till now that until the beam demonstrations were finished that it really would work, but now I would say that it is our darling, and if I might steal a line from the

fair Bianca, "We'll always be true to the RFQ, in our fashion. We'll always be true to you darlin', in our way."

In the area of the new types of machines, we heard about several ways that the often troublesome wake fields might be made to work in our favour, and it's good to see that experimental work is already well underway in this area. In addition we heard about a collective heavy ion accelerator that's also being tested already. We see an increasing interaction between the particle accelerator field and the laser field, in particular the free electron laser will provide challenges to the electron-linac designers for the next several year.

The are a number of teams that are working on the laser-driven photo cathode that will provide better electron sources, and once again we were impressed by the effectiveness of the movie in making the presentation in a very nice and concise way. And there are also schemes for using lasers for advanced diagnostics. We heard a fascinating talk, I thought, on superconducting cavities and the announcement of substantial progress in just the last year, where 5 MV/m accelerationg gradient can now be achieved realiably in multi-cavity systems from 300 MHz all the way to 3 GHz. There are great gains in the thermal stability of these systems in finding and fixing the defects on the surface. The challenges are to continue working on and improving the conductivity of the surfaces. In fact, the electron field emission limit may be the next barrier that will have to be considered. In the theory and simulation areas, there were several topics that stood out for me. First, there was discussion of important progress that's been made in understanding theoretically beam cavity interactions and beam break-up type problems. Secondly, we saw again a lot of work in better codes, cavity design codes. There's increasing emphasis on how we can start 3-D codes to give us answers on the complicated circuits that we now work with. There are some very nice coupled-circuit type modeling codes that give a great deal of insight into the interactions between the cavities and various modes. Thirdly, was the very important topic of high current beam transport in acceleration, which formed the theme in the last conference, and which continued in this conference, until in fact the demand was made for a special session and discussion here. What we are seeing now is a systematic experimental investigation and verification of many of the things which were investigated before from mostly a numerical simulation point of view.

There are now three transport line groups testing the limits in electrostatic and magnetic quadrupoles and solenoid channels, and I think their work should be commended; I think the experiments in this field were often harder to execute than the numerical experiments. The fact that the agreement is so good is very much due I think to the quality of the work that these teams are doing. We have also another experiment that I remind you of in that area that demonstrates these channel limits, and that is the RFQ. All of the beam experiments on the RFQ very much are sophisticated demonstrations of the capabilities of the single channel, and the understanding that we've achieved and the success of the agreement is something that's very good to see. There are many more fascinating questions remaining: we need more thorough characterization of the distributing functions of the beams; how to parameterize that and how to apply it to the design of better machines which have even less emittance growth and less particle loss. There was a great deal of work discussed on electron linacs. CW electron accelerators, RF tubes (which are really the inverse in some sense of linacs); this is a very challenging area, and in fact, so challenging that the suggested site of the next Linac Conference is at Stanford, to be held in the late spring or perhaps the early winter of 1986, depending on some fit with other conferences. The talks this morning are still fresh on our mind, and I won't dwell on those, but to me I thought it was important to notice that the talks this morning may be concentrated on the applications of accelerators to many of the different needs of society, beyond physics research, and I think that to many of us that is a very satisfying aspect of the field.

So the scientific content of the meeting, I think, was very high, and it was very exciting, with a satisfying mixture of in-depth and professional development of recurring themes and of new and exciting ideas. So I would like to turn then just for a moment to some of the other aspects of the meeting. The visits to the labs were really extremely interesting during the week and many of us are looking forward to further visits this afternoon and next week. Our afternoon at GSI was really most productive, and we appreciated that the machine was not operating, allowing our inspection of the facilities and also that the expertise in operating this very impressive facility was transferred to the continuous production of refreshments from the moment we arrived throughout the visit without any downtime.

We appreciate the display of the industrial exibitors at the meeting and their collaboration and their support of our endeavors. For example, in permanent magnet materials our requirements do meet in fact the most challenging of their specifications and in meeting this challenge there will be many side benefits to that particular field.

We were very pleased to have the opportunity to see something of art and culture in Germany as well. This ranged from the beautiful music of the Middle Ages which was researched from the archives by a scientist/historian/physicist who also made with his own hands the medieval horns that they played. And from that to the exciting production of Shakespeare which I already referred to; the play was certainly in the avant garde style for which the German theater has a long tradition and for which it is justly famous. It was interesting to hear and see how the cities and institutions of Darmstadt, Heidelberg and Seeheim are so supportive of science and technology alongside the cultural and artistic activities, and to reflect how fortunate we are that our own everyday work approaches art in so many aspects. In Darmstadt, you can even see this particularly, because they have already enshrined the form of the GSI RFQ in a church steeple.

And, as we sampled the music of the old and new, it was also very interesting to hear from Herr Gudden about the history of science in this region. So we thank all the cities and persons for their hospitality. We thank Lufthansa and their staff for providing such a very fine and convenient setting for the meeting.
And finally, and saving the highest praise and appreciation until now, it is my privilege really to represent all of the conferees in thanking all of those from GSI who have labored so hard to make this meeting so smooth and memorable. So we thank you all.

Thanks to Professor Schmelzer who is the founder of GSI and Herr zu Putlitz, a past director who was so instrumental in bringing the meeting here and making these arrangements which we all enjoyed; Herr Angert, the co-chairman, who handled all the details of the program, all the work; Herr Kienle the present director of GSI for his hospitality and the hard work of his staff; the photographers, who are still at it, for all the shots that we are able to take with us and which will bring back many memories; to Herr Angerts staff, Ursula

Grundinger and Kerstin Möller and all the others of the Secretariat who helped us very hard and actually helped keep Herr Angert on the track I think. So we thank you all, and we will do that individually in our own many ways, and in our own languages so that we can express our feelings most precisely in that respect, but at this moment I would ask for the collective effect to be demonstrated.

And so we come to the close, and for this I would like to use again the language of our host, which for me has always expressed so well the idea that while we now part company from many colleagues after this very productive meeting, it is with the full expectation that we will soon see each other again.

Auf Wiedersehen!