PREFACE

SPring-8, one of the world's brightest synchrotron radiation sources covering from the soft to hard X-ray ranges (0.5 keV to 300 keV), succeeded in accumulating the electron beam in March 1997 and subsequently, started experimental tests on several beamlines from July of the same year. In October 1997, the facility was opened to outside users for experiments on ten beamlines.

Here, we present a report on the performance of the X-ray source and some of the experimental results obtained at SPring-8 from October 1997 to November 1998. This period corresponded to the first two terms of operation in the user service mode and involved more than 400 experiments conducted by 1800 users.

The X-ray source has already surpassed the expectations under the original design. Routine operation of the storage ring was achieved with a horizontal emittance of $7x10^{-9}$ m·rad and a coupling constant of 0.1%. These low values for the emittance and coupling constant resulted in vertical emittance and vertical beam size values as small as 10^{-11} m·rad and 10 mm, respectively. Direct measurement of the beam size is currently underway using several methods. The stored current has reached 100 mA with a lifetime longer than 60 hours. The source can be operated in the full-filling mode, 21-bunch mode, or single-bunch mode. The stability of the beam is extremely high and daily changes due to earth tides can be clearly observed in the storage ring circumference. This high performance of the source provides users with new opportunities for exploring new areas in various research fields.

This report covers the results of experiments classified into five groups, namely Life Science, Diffraction and Scattering, XAFS, Spectroscopy, and Instrumentation and Techniques. Many interesting results obtained at SPring-8, however, are not included in this volume simply because their data have not yet been fully analyzed, and in some cases the papers are yet to be published.

At this time, sixteen beamlines are in operation - ten public, one R&D, one contract and four JAERI/RIKEN beamlines. The results presented here were obtained from these beamlines.

We are now constructing nine public beamlines (including an infrared beamline), five contract, three JAERI/RIKEN, two R&D and two machine-study beamlines. Two RIKEN beamlines are to be special types. One is being built along a straight section where a 30-m undulator will be installed. The other will be a 1km-long beamline from an in-vacuum undulator.

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