

Orbit drift in KEKB ring

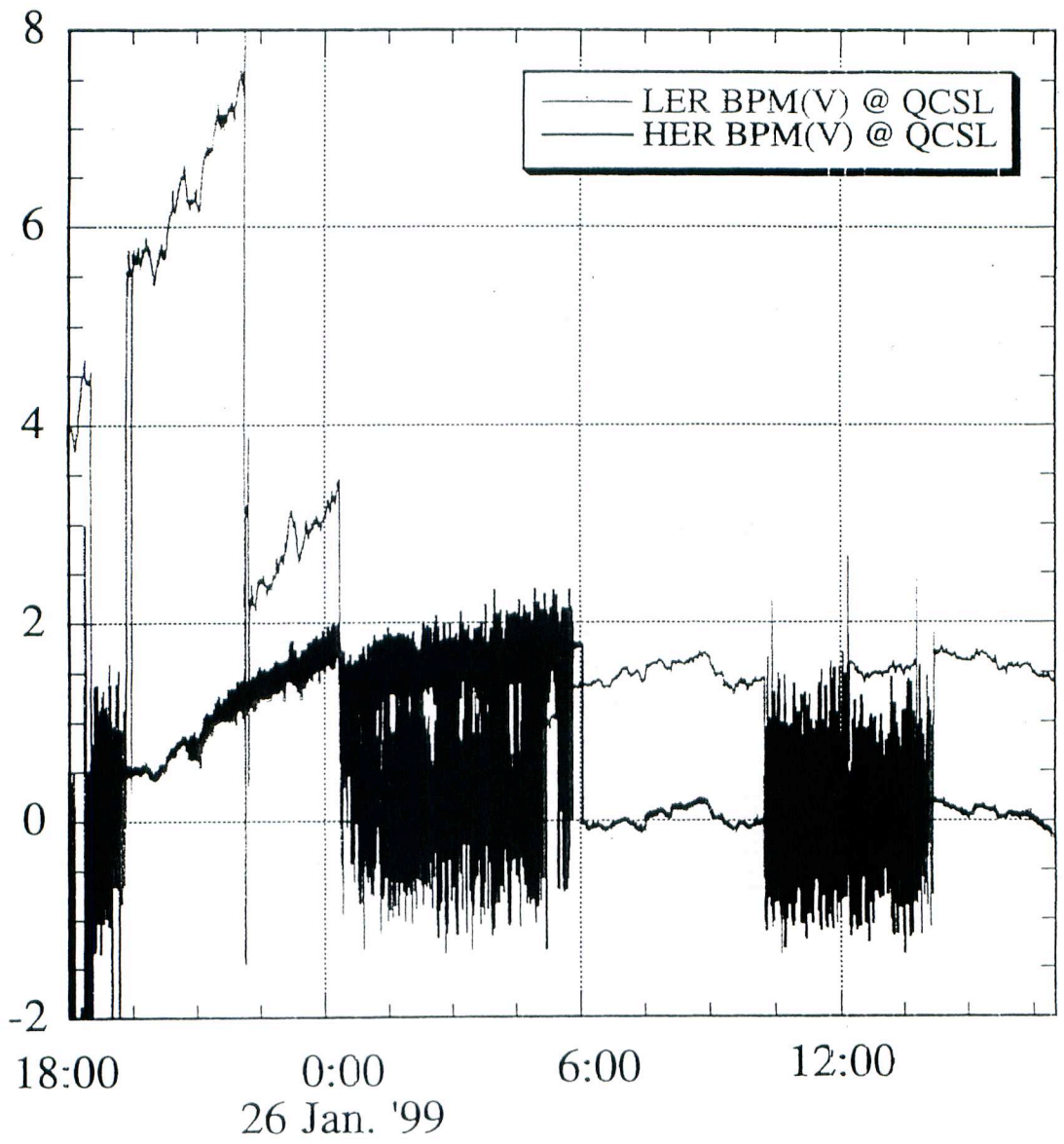
Now the orbit drift in KEKB ring is one of the major problems. It is a problem because it:

1. Prevents the parameter measurement necessary for machine tuning.
2. Degrades the performance for physics experiments.

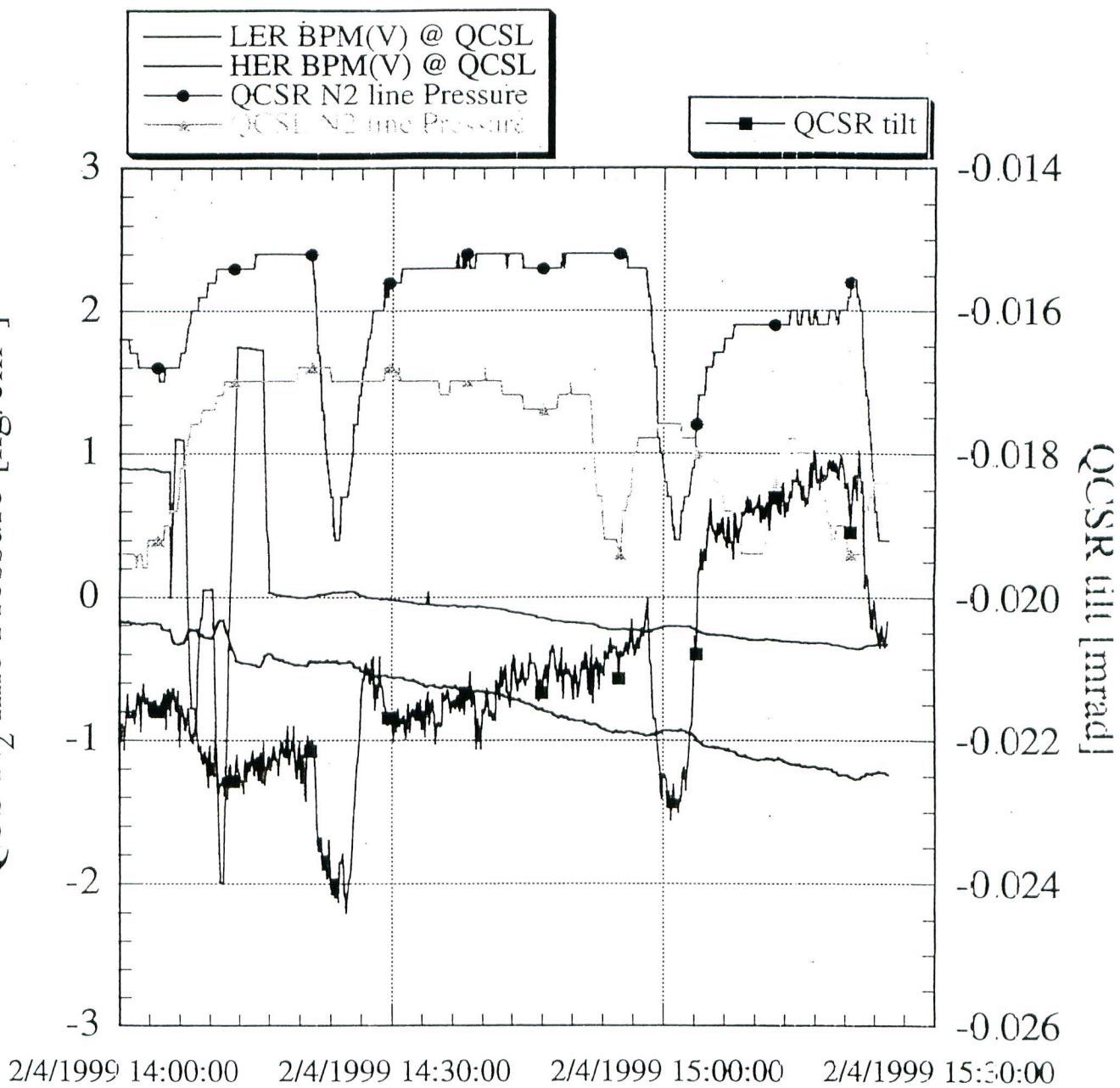
We had dedicated machine time for measuring the orbit drift on Feb. 14th and 15th. Environmental parameters were recorded along with the BPM readings, which include:

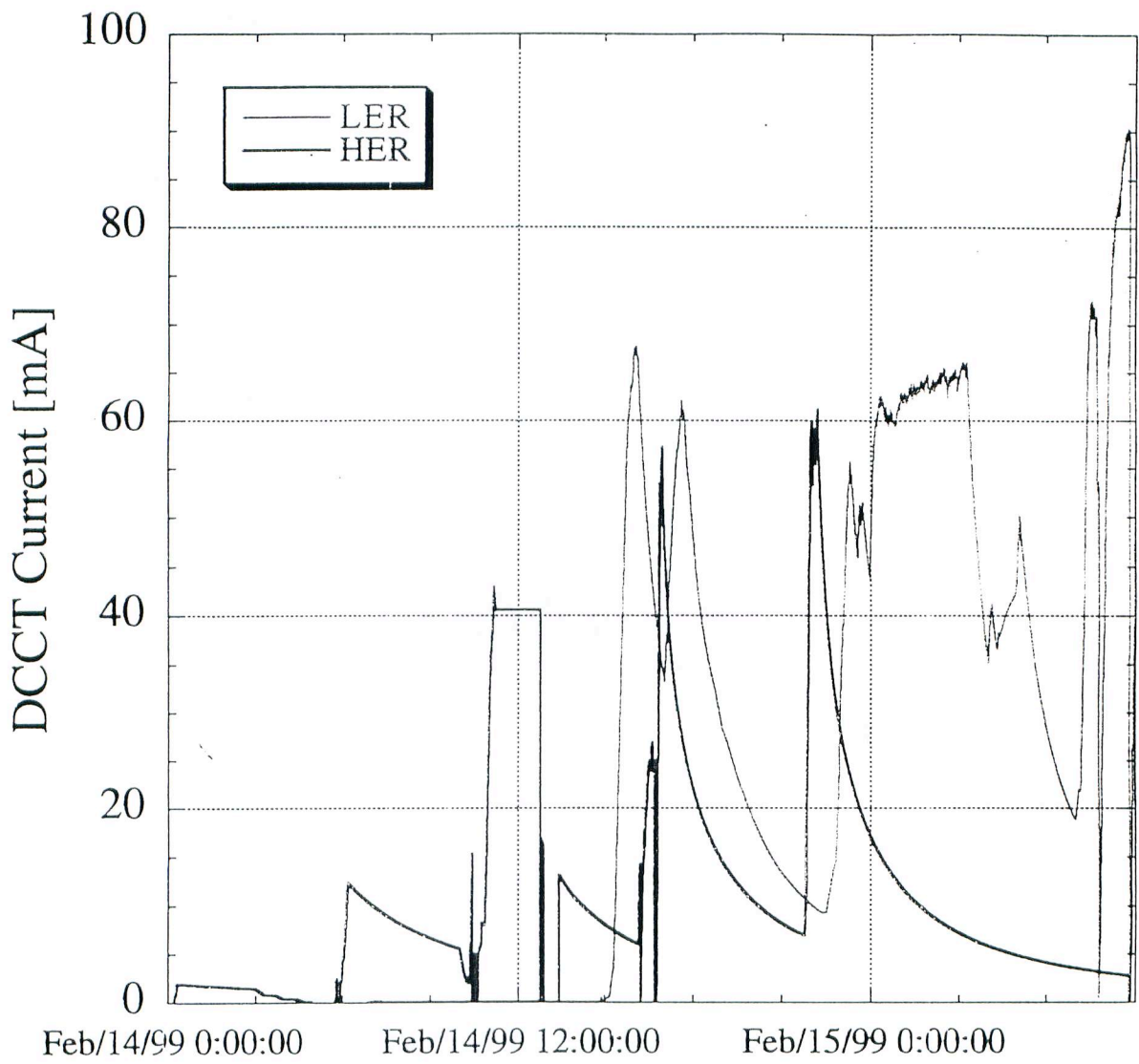
- Temperatures
 - base and shield of IR
 - near the magnet power supply
 - cooling water of magnets
 - vacuum chamber
 - support of Q magnets (normal and QCS)
 - air in tunnel
- QCS parameters
 - temperatures
 - pressures
 - strain in the support rods
 - tilts
 - distance from the floor
- K-values of magnets

Vertical BPM reading [mm]

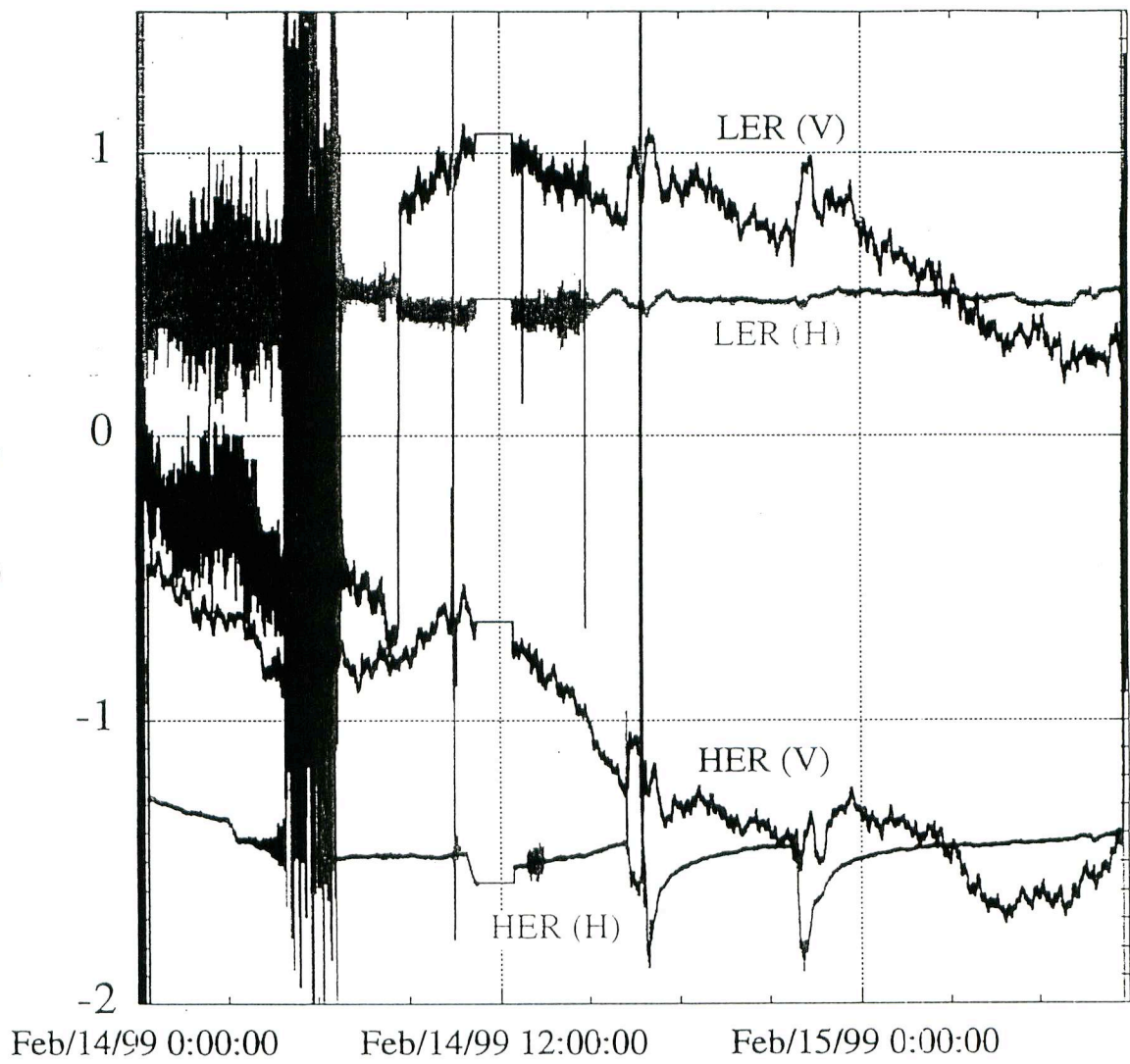


Vertical BPM reading [mm]
QCS N₂ line Pressure [kg/cm²]

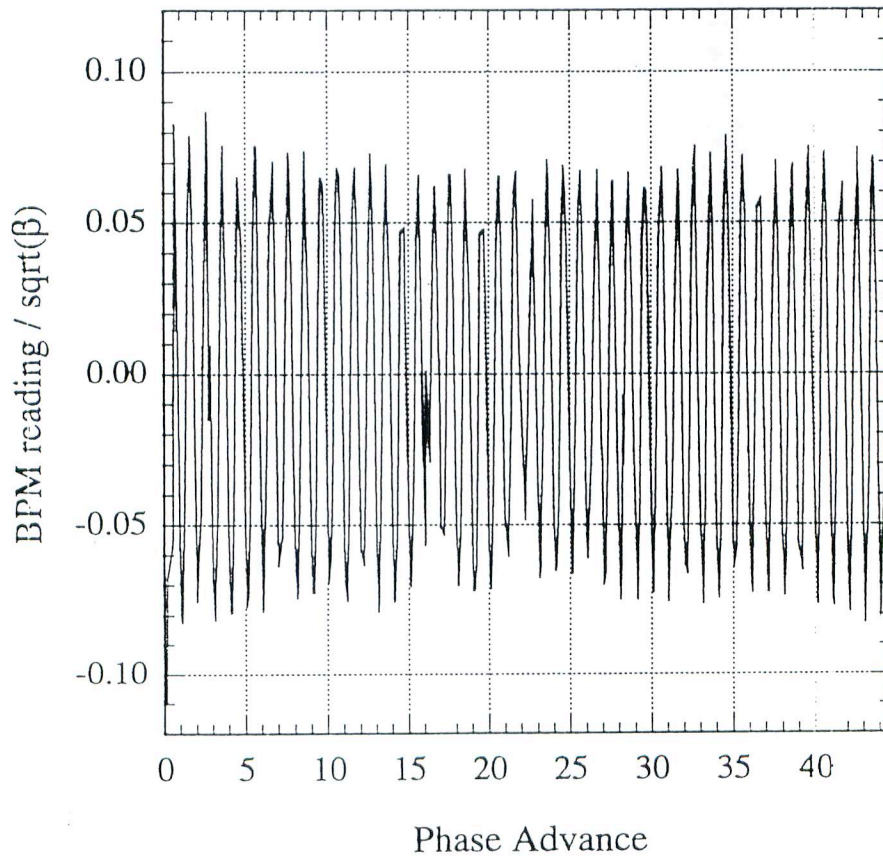
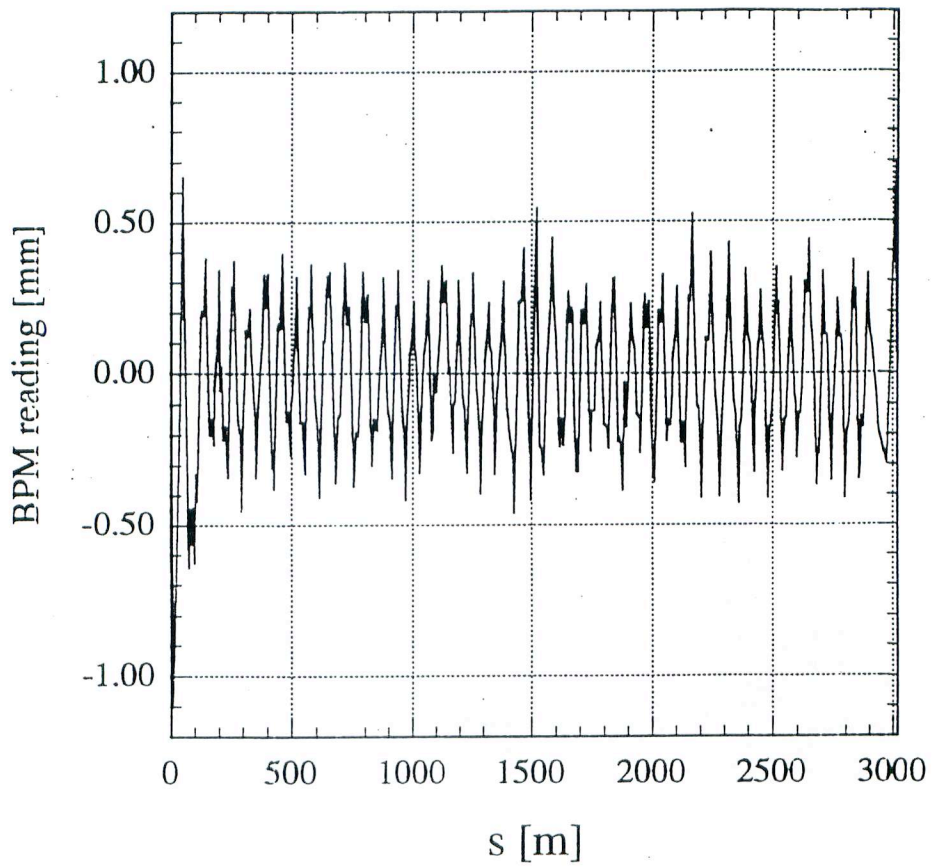


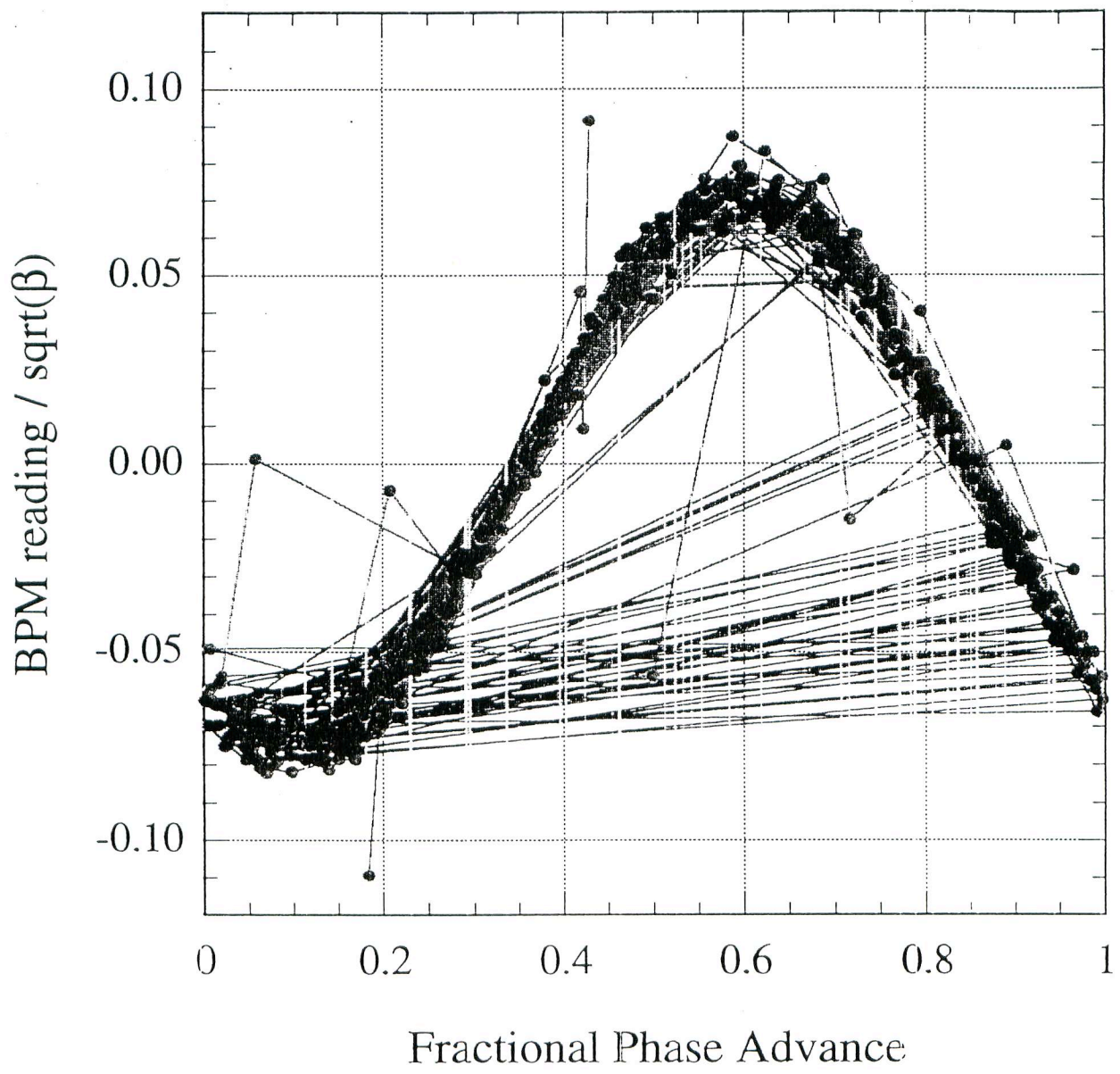


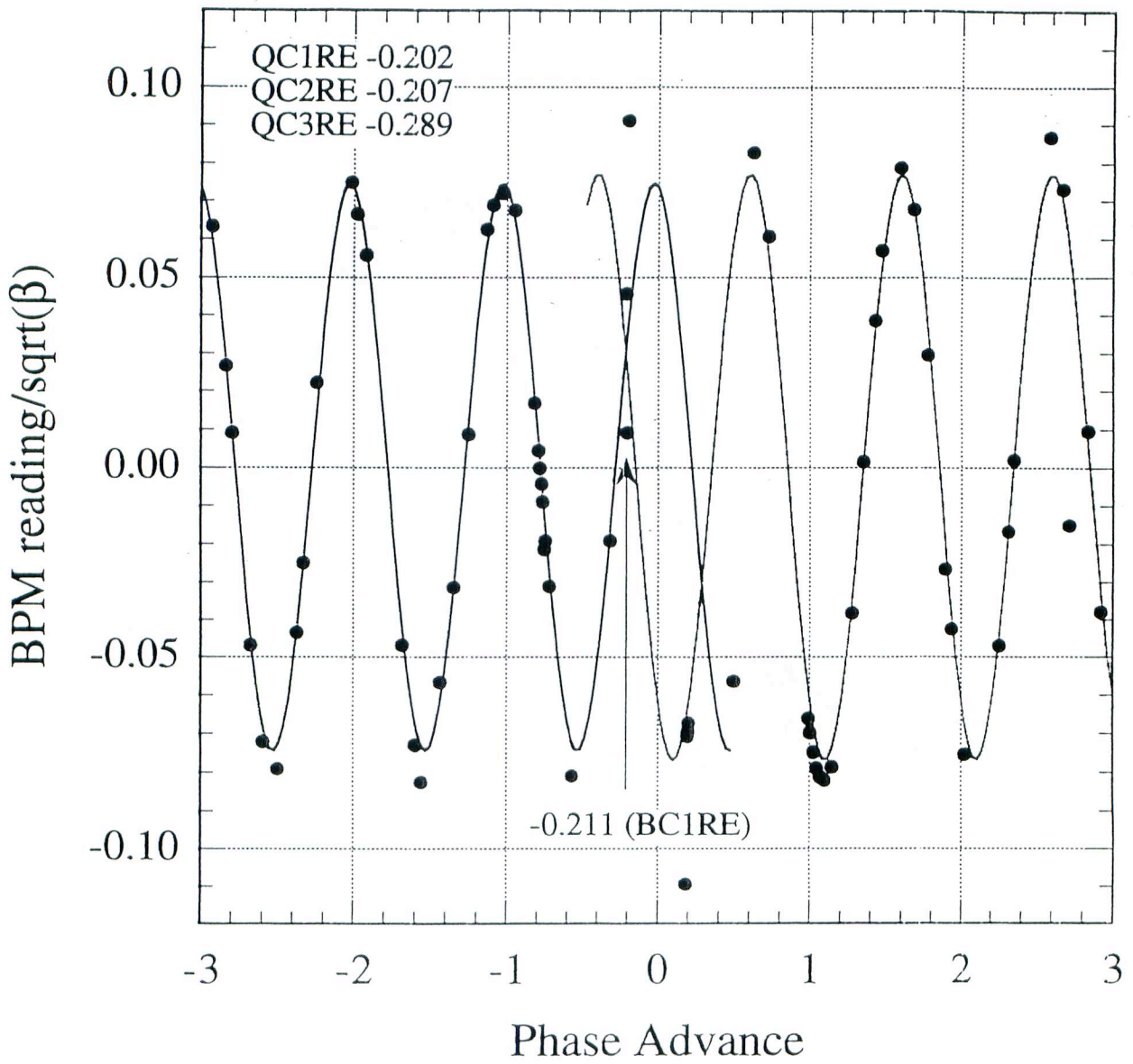
BPM reading @ QCSL [mm]



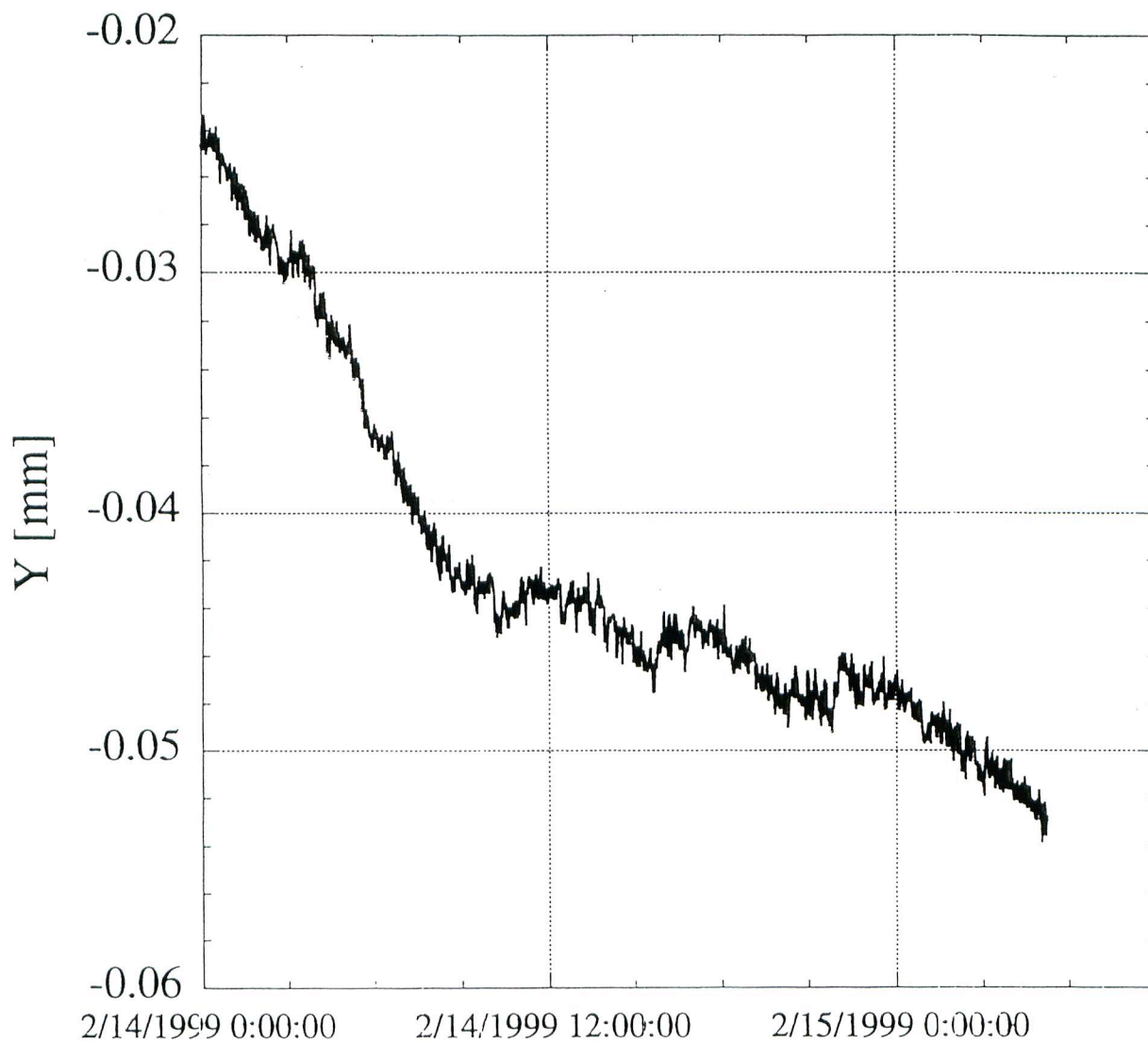
HER horizontal BPM reading



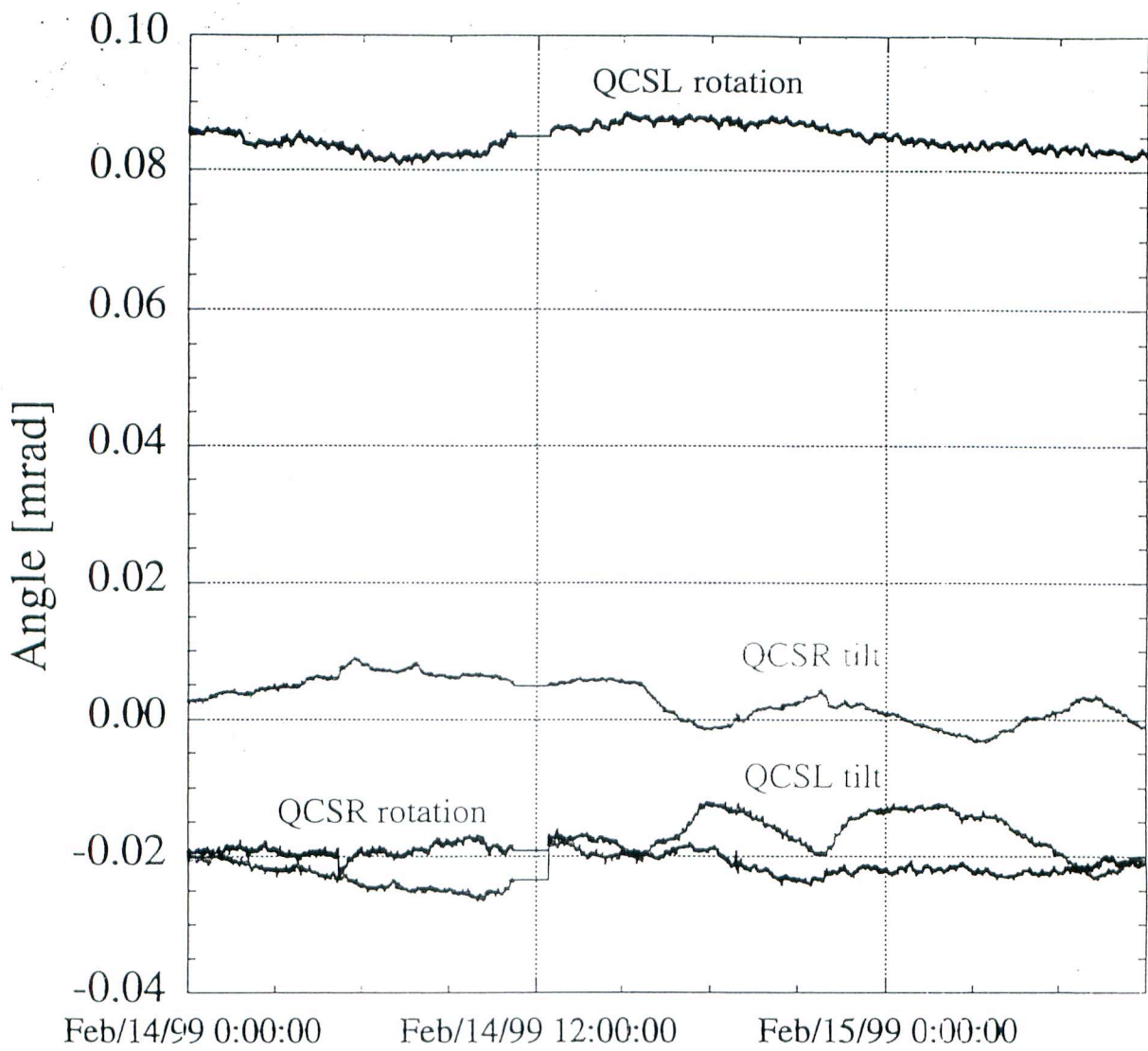


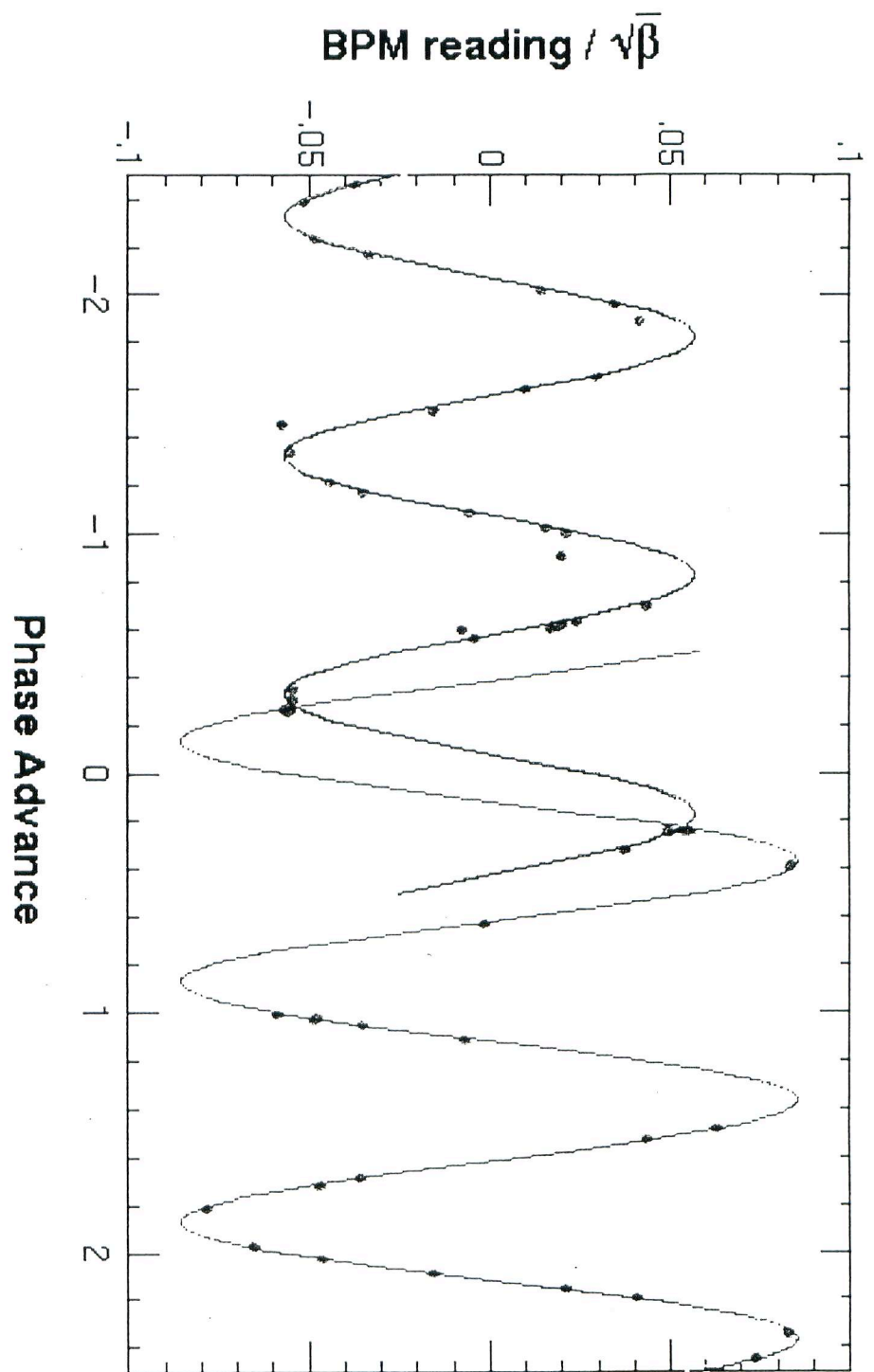


Change in Distance between the Floor and QCSR base
(measured by a laser interferometer)

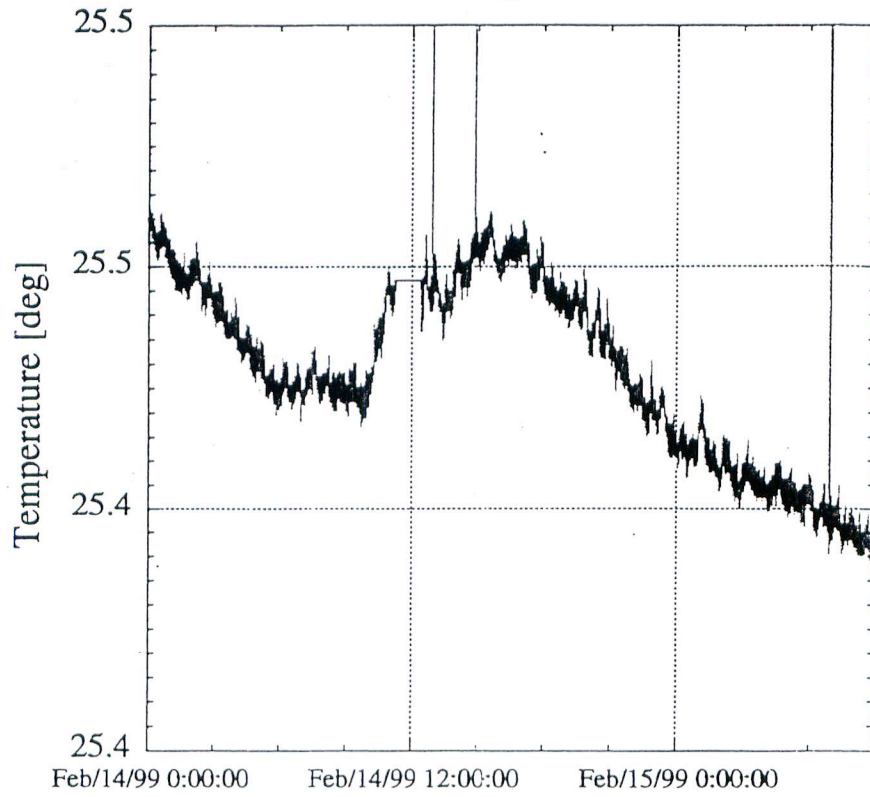


Tilt and Rotation of QCS

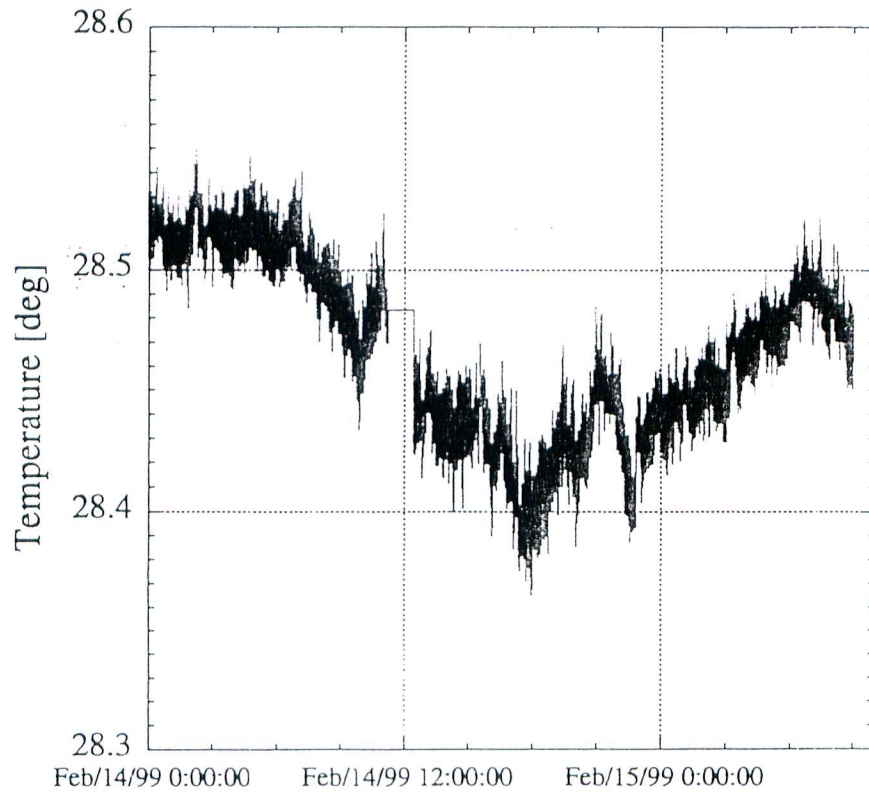




Shield outer wall temperature
(outside of ring, Nikko-side)



Air outlet of air-conditioner



The result shows that:

1. Horizontal orbit is relatively stable except the strong correlation to the beam current and it is caused at the interaction region.
2. Vertical orbit drift seems to consist of three components:
 - long term drift (typical time scale ~ 10 hours, amplitude ~ 1 mm)
 - short term drift (typical time scale ~ 10 minutes, amplitude ~ 0.1 mm)
 - drift which is correlated to the beam current.
3. Vertical orbit drifts in HER and LER are strongly correlated, which suggest that they are caused near the interaction region.
4. Long term vertical orbit drift may be caused by the temperature change around the interaction region.
5. There is a correlation between the beam current and the geometry of the QCS.