BNL-104046-2014-TECH

AGS.SN169;BNL-104046-2014-IR

Temperature Effects on RF Cavity Tuning

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November 1984

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U.S. Department of Energy

USDOE Office of Science (SC)

DISCLAIMER

Number 169

AGS Studies Report

Date(s) November 11, 1984 Time(s) 1300 - 1800

Experimenter(s) W. Frey and J. Woods

Reported by W. Frey

Subject(s) Temperature Effects on RF Cavity Tuning

Observations and Conclusions

This was a continuation of the temperature effects on the rf cavity tuning reported in AGS Studies Report No. 165. When the cavity cooling water inlet temperature is raised above 77°F, the cavity tuning variations due to temperature are no longer apparent. Vernier tuning current, gap volts, and output tube cathode current were monitored as indicators of cavity tuning. The water temperature was raised in 2 to 3°F increments from 75°F to 85°F.

Based on the measurements, the cavity cooling water input temperature was raised to 80°F. The temperature chart recorder will be monitored to determine long-term temperature variations.

Method and Test Setup

The rf system was run on synthetic sweep and the gain control was adjusted to produce a nominal 5 kV gap volts. The MTS slope and break point was adjusted for minimum cathode current spiking (indicator of cavity tuning mismatch). There is a nominal 2°F temperature differential between the cavity water input and output temperature.

After a set of oscilloscope photos of I_{VTS}, V_{GAP}, and I_K were taken, the input water temperature set point was raised. Thermal equilibirum was indicated when the temperature differential of 2°F was achieved for 15 minutes.

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