



BNL-104017-2014-TECH

AGS.SN139;BNL-104017-2014-IR

AGS Beam Blowup by Kr Gas (preliminary of E-778)

H. C. Hseuh

January 1983

Collider Accelerator Department
Brookhaven National Laboratory

U.S. Department of Energy

USDOE Office of Science (SC)

Notice: This technical note has been authored by employees of Brookhaven Science Associates, LLC under Contract No. DE-AC02-76CH00016 with the U.S. Department of Energy. The publisher by accepting the technical note for publication acknowledges that the United States Government retains a non-exclusive, paid-up, irrevocable, world-wide license to publish or reproduce the published form of this technical note, or allow others to do so, for United States Government purposes.

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or any third party's use or the results of such use of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

AGS STUDIES REPORTDate January 13, 1983Time 1500 - 1540Experimenters H.C. Hseuh and E. GillReported by H.C. HseuhSubject AGS Beam Blowup by Kr Gas (Preliminary of E-778)OBSERVATIONS AND CONCLUSIONPurpose

To study the effect of residual Kr gas on the AGS beam to determine the limit of the gas jet experiment (E-778).

Study

The test was carried out on January 13, 1983 during the FEB run. Kr gas was bled into the AGS at IPM and pumped away by two turbos at E7 and E17, and by nearby ion pumps. A localized Kr gas zone about 10-15 meters (FWHM) in length was created during the 40-minute study with peak pressure as high as 2×10^{-5} Torr at IPM. The pressure distribution and beam profile were recorded at five different Kr gas levels.

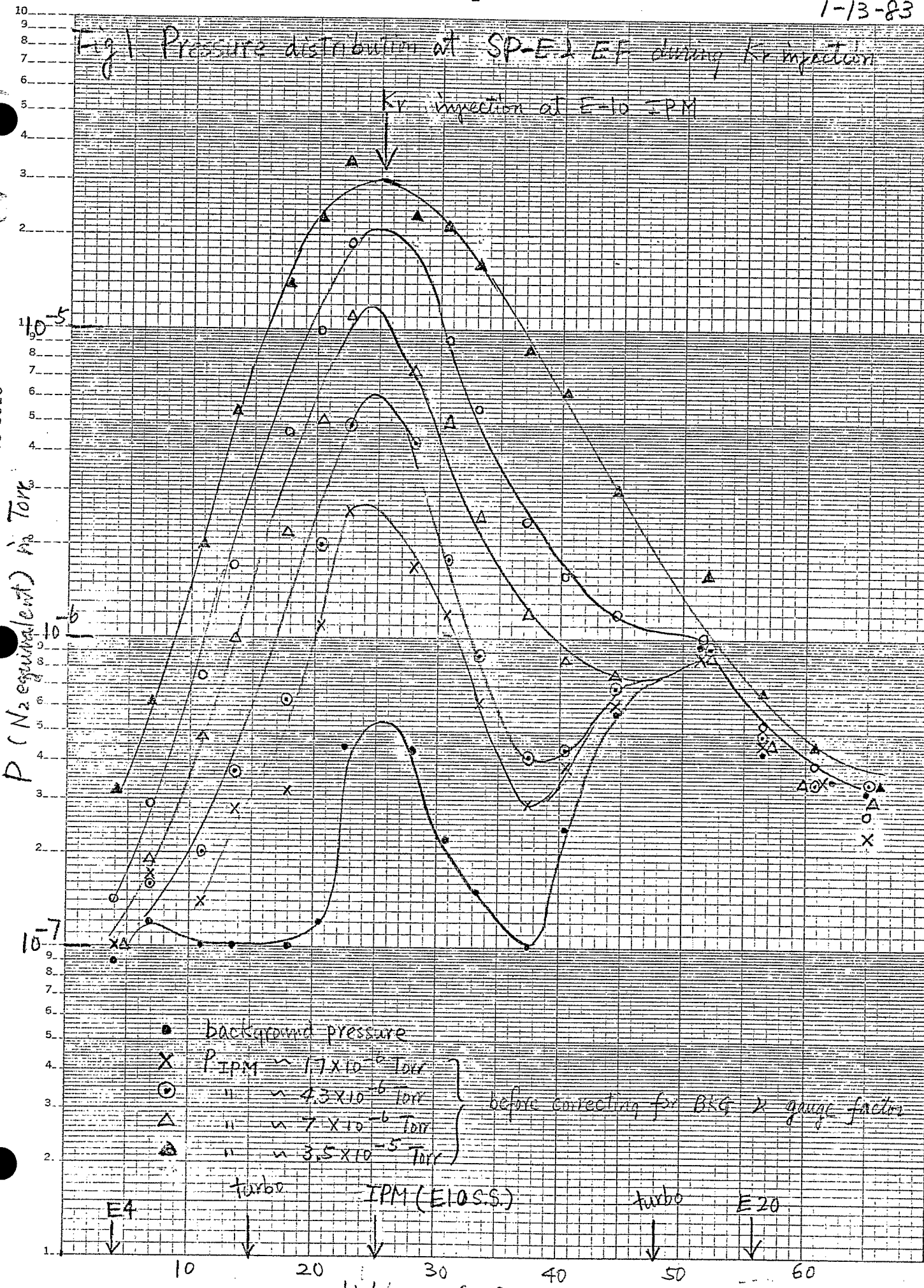
Result

The residual gas pressure distributions at superperiods E and EF are shown in Figure 1. The majority of bled-in Kr was removed by two turbomolecular pumps. The amount of Kr diffused into other superperiods was negligible. The integrals of the pressure distribution ($\int P d\ell$) are plotted versus the standard deviations σ of the beam profile in Figure 2. Up to $\sim 27\%$ increase in σ (both horizontally and vertically) and 10% decrease in beam intensity were observed at $P \times \ell \sim 3 \times 10^{-4}$ Torr m.

The proposed operation limit of E-778 with $\leq 10\%$ Kr or Xe will have $P \times \ell < 1 \times 10^{-4}$ Torr·m, which will increase σ by $< 10\%$.

1-13-83

Fig 1 Pressure distribution at SP-E2 EF during Kr injection



- background pressure
 - X P_{IPM} ~ 1.7×10^{-6} Torr
 - " ~ 4.3×10^{-6} Torr
 - △ " ~ 7×10^{-6} Torr
 - ▾ " ~ 3.5×10^{-5} Torr
- } before correcting for BKG & gauge factor

46 6010

SEMI-LOGARITHMIC 4 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

SEMI-LOGARTHMIC 2 CYCLES X 70 DIVISIONS AD-0833-60

GRAPHIC CONTROLS CORPORATION Buffalo, New York Printed in U.S.A.

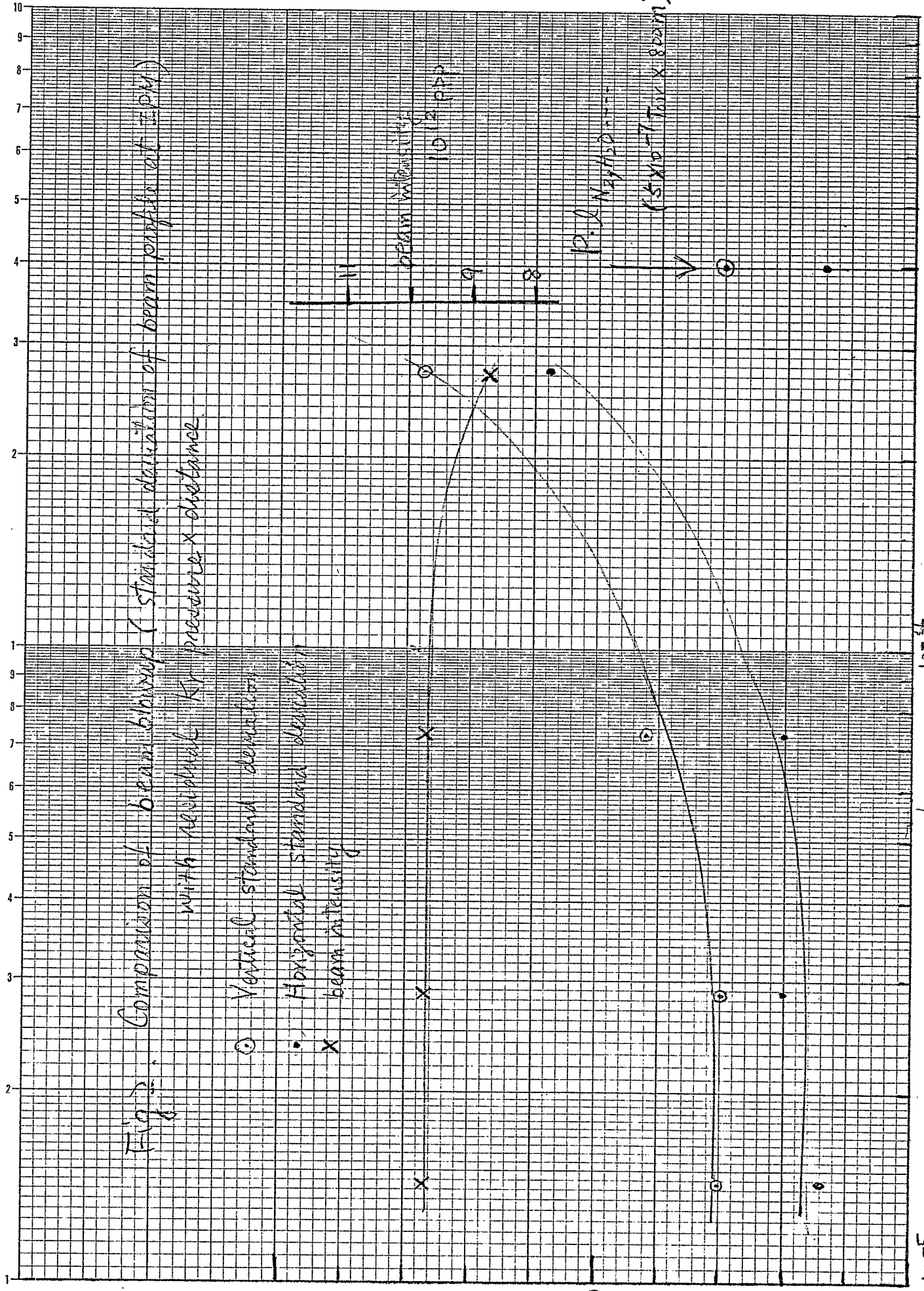


Fig. 2: Comparison of beam blurring (standard deviation of beam profile at IPM) with residual Kr pressure x distance.

P.L. Kr (Torr · m)