FOCUSSING OF AN ION BEAM FROM A REFLEX TRIODE*

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PURPOSE:

USE AN ELECTRON BEAM IN A REFLEX TRIODE TO EXTRACT AN ION BEAM FROM A BACKGROUND PLASMA

METHOD:

USE THE ELECTROSTATIC SPACE CHARGE FIELDS TO ACCELERATE, FOCUS, AND TAILOR THE ARRIVAL TIMES OF THE IONS ON A TARGET --- PREFERABLY IN SPHERICAL GEOMETRY

ADVANTAGES:

POWER MULTIPLICATION DUE TO TAILORING OF THE ION ARRIVAL TIMES

BETTER FOCUSING PROPERTIES OF IONS

TARGET PHYSICALLY REMOTE FROM BEAM SOURCE

PAST RESULTS (low energies)

SUCCESSFUL EXTRACTATION OF AN
ION BEAM FROM A BACKGROUND PLASMA
USING ELECTROSTATIC SPACE CHARGE
FIELDS

POWER MULTIPLICATION BY TAILORING THE
ARRIVAL TIMES OF THE IONS AT THE TARGET

RECENT RESULTS (high energies)

VERIFICATION OF THE LOW ENERGY RESULTS
BY SUCCESSFULLY EXTRACTING AN ION BEAM
FROM A BACKGROUND PLASMA WITH AN
EFFICIENCY OF $\sim 20\%$ USING ELECTROSTATIC
SPACE CHARGE FIELDS

PRESENTLY STUDYING THE EFFICIENCY,
FOCUSSING, AND ARRIVAL TIME PROPERTIES
OF DIFFERENT GEOMETRIES

$t=0$ $Z = 7.62 \text{ cm}$

OFF AXIS
SCINTILLATOR
PROBE

0.5 V/div

20 ns/div

ON AXIS
FARADAY
PROBE

3.7 A/cm²/div

20 ns/div

 $t=0$

n)

PLANES OF SCINTILLATOR PLATE MEASUREMENTS

$z = 3.81 \text{ cm}$

$f/16$

PLANE a

$z = 4.76 \text{ cm}$

$f/11$

PLANE b

$z = 5.08 \text{ cm}$

$f/8$

PLANE c

$t=0$

ON AXIS
FARADAY PROBE

4.94 A/cm²/div

20 nsec/div

Z = 10.75 cm