



E & B bend (x,dE)=0

M. Portillo

MICHIGAN STATE
UNIVERSITY



U.S. DEPARTMENT OF
ENERGY

Office of
Science

Purpose

- Create an energy achromat system
 - Using double focusing
 - E-dipole
 - » Bend of 90deg at $R=0.2$ m
 - spherical electrodes for equal x- and y-focus strength
 - » Drift before and after bend = R
 - B-dipole
 - » Bend of 90deg at $R=0.2$ m
 - » 26.56deg entranc & exit edge angles for equal x- and y-focus strength
 - » Drift before and after bend = $2R$
- Result:
 - Possible to get $(x,dE)=0$ but not $(a,dE)=0$
 - » i.e. energy spread effect is cancelled out only at focus position
 - Demonstrates the two dipoles of equal R can focus in (x,dE) and obtain $(x,dMass)_{\text{Full system}}=(x,dE)_{\text{Electrostatic}}$

Maps

Order 1 maps

E-BEND FOCUS.POS

-0.9999986	-4.999997	0.000000	0.000000	-1.000000	10000000
0.5661256E-06	-0.9999986	0.000000	0.000000	-0.4000000	01000000
0.000000	0.000000	-1.000000	-5.000000	0.000000	00100000
0.000000	0.000000	0.1110223E-15	-1.000000	0.000000	00010000
0.000000	0.000000	0.000000	0.000000	1.000000	00001000
0.4000000	1.000000	0.000000	0.000000	0.6438050E-01	00000100
0.1101071E-06	0.2752677E-06	0.000000	0.000000	-0.1785397	00000010
-0.4000002	-1.000001	0.000000	0.000000	0.1141592	00000001

$(x, dE)_1$
 $(x, dM)_1$
 $(x, dQ)_1$

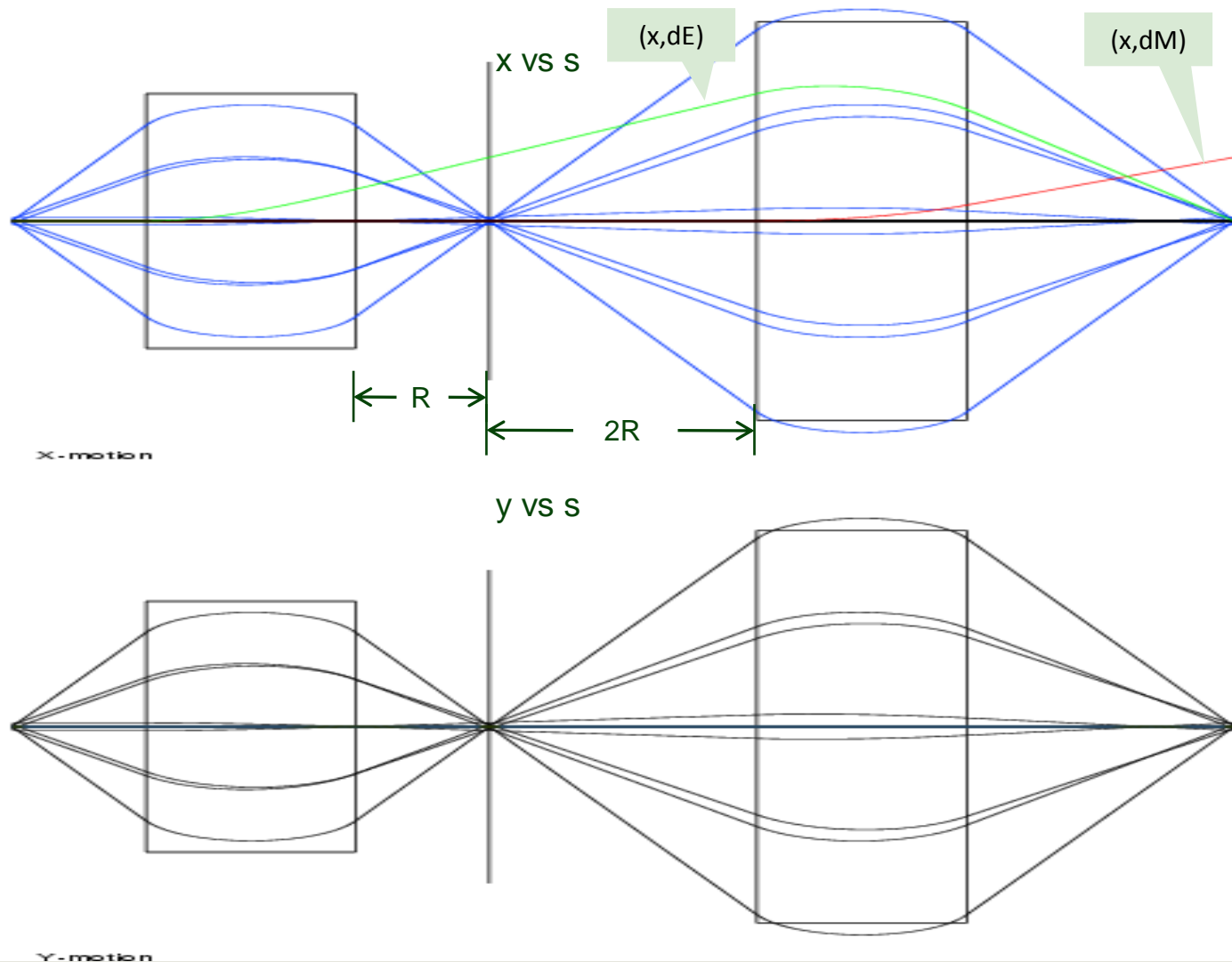
E+B BEND FOCUS.POS

1.000045	8.750076	0.000000	0.000000	1.749992	10000000
0.6126912E-05	1.000009	0.000000	0.000000	-0.1764503E-05	01000000
0.000000	0.000000	0.9999564	8.036445	0.000000	00100000
0.000000	0.000000	-0.6693090E-05	0.9999898	0.000000	00010000
0.000000	0.000000	0.000000	0.000000	1.000000	00001000
-0.1248663E-04	-1.750023	0.000000	0.000000	-0.3856183	00000100
0.3999989	0.7499970	0.000000	0.000000	-0.4856194	00000010
-0.3999865	1.000026	0.000000	0.000000	0.8712378	00000001

$(x, dM)_2 = (x, dE)_1$
 $(x, dE)_2 = 0$

Ray plots vs s

Order 1



Ray properties

$x = \pm 0.5$ mm, $a = \pm 60$ mrad

$y = \pm 0.5$ mm, $b = \pm 60$ mrad

$\delta_E = +0.02\%$, $\delta_M = 0.02\%$