

MUSC1604

K YghYfb'A i g]W'U'DUbcfUa U

7ci fgY'Cj Yfj]Yk

GHJZZ7cbHJWh8YHJ]`g

7cbj Ybcfg

B Ua Y	9a U]`	5j U]`UV]`] m	@cWUh]cb	D\cbY
9a YfmGVWi VYfh	Y"gVXiVYfh4 i bgk "YXi"Ui	VmUddc]bha Ybh	Fcca '%\$%ž FcVYfh KYVghYf 6i]`X]b[-',)*,\$,

GWXcc`7cbHJWh =bZcfa Uh]cb

GWXcc`cZh\Y'5fhg'UbX'AYX]U

Fcca " %&ž@YjY`" žFcVYfhK YVghYf'6i]X]b['f) %(Ł

D\cbY.'f\$&E'-',)'(,)*

9a U]`. 'gUa 4 i bgk "YXi "Ui

K YVg]hY. k k k "Ufhg"i bgk "YXi "Ui #gUa

 $\label{eq:hamiltonian} $$HY'GWCC``cZhY'5ftg'UbX'AYX]U'kci`X``]_Y'tc'FYgdYWM\cong \cong m5W_bck``YX[Y'h\Y'HfUX]tjcbU``7igtcX]Ubgž h\Y'6YXY[U'`fPYbg]b[tcb'WJadigŁZ'; UX][U'`fP]tmUbX'5fthZ''8Yg][b'7UadigYgŁUbX't\Y'B[ibbUkU`dYcd'Y'fbighfU`]Ub'8YZYbW': cfW'5WJXYam]b'7UbVYffUŁ'cZh\Y'`UbXg'k\YfY'YUW\'WJadig'cZIBGK']g`cWJhYX''$

7ci fgY⁻8YHJ]^{*}g

7 fYX]h'Dc]bhg '* '

Gi a a UfmcZ'h\Y'7ci fgY

5ggYgga Ybh

D`YUgY`gYY`AccX`Y`Zcf`XYHJ]`YX`]bZcfaUh]cb`UVcih'h\]g`WcifgY"

5ggYgga Ybh'HUg_g

5ggYgga Ybh'hJg_	K Y][\h	8i Y'8UHY	Gh XYbh@YUfb]b[Ci hWca Ygʻ5ggYggYX
DfYgYbHJHjcb`UbX dUfHjWjdJHjcb`	' \$I	Bch5dd`]WUV`Y	&ž'
HYgh	')।	Bch5dd`]WUV`Y	&ž¨'
@]ghYb]b['HYgh'	')	Bch5dd`]WUV`Y	%ž [*] &

5ggYgga Ybh'8YhJ]`g

5ggYgga Ybh'% 'DfYgYbhJh]cb 'UbX'dUfh]W]dUh]cb

GhUfhXUhY. Bch5dd`]WUV`Y

8 YHJ]`g.

%) \$\$ 'k cfXg" '

Gh XYbhg fYWY]j Y k f]hhYb ZYYXVUW_UbX U bi a Yf]WU`a Uf_"

5XX]h]cbU`XYhJ]`g.

 $\label{thm:local_def} \begin{tabular}{ll} Hi hcf]U``UggYgga YbhhUg_g`k]```VY`dYfZcfa YX`h\fci [\ci hhi hcf]U```WUggYg"``5XX]h]cbU``]bZcfa Uh]cb`k]```VY dfcj]XYX`cb`A ccX`Y`UbX`]b``WUgg" \\ \end{tabular}$

5ggYgga Ybh'& HYgh

GhUfhXUhY. Bch5dd`]WUV`Y

8 YHJ] g.

*\$ Ei Yghcbg

Gh XYbhg fYVW]j Y U bi a Yf]WU`a Uf_'UbX U dfYdUfUhcfmihYgh'

5XX]h]cbU`XYhJ]`g.

 $\label{thm:continuity} $$HYY'WcbhYbhHYghg`k\]```VY`\Y`X`Xi\ f]b[\ ``YWh\ fYg`cf`h\ hcf]U`g`cf`gdYV]U``miUffUb[\ YX`h]a\ Yg`Ug`]bX]WUhYX`]b`h\YWchfgY`gV\XYi\ `Y`h]a\ YhUV`Y''$

5ggYgga Ybh' @]ghYb]b[HYgh

GHJfhXUhY. Bch5dd`]WUV`Y

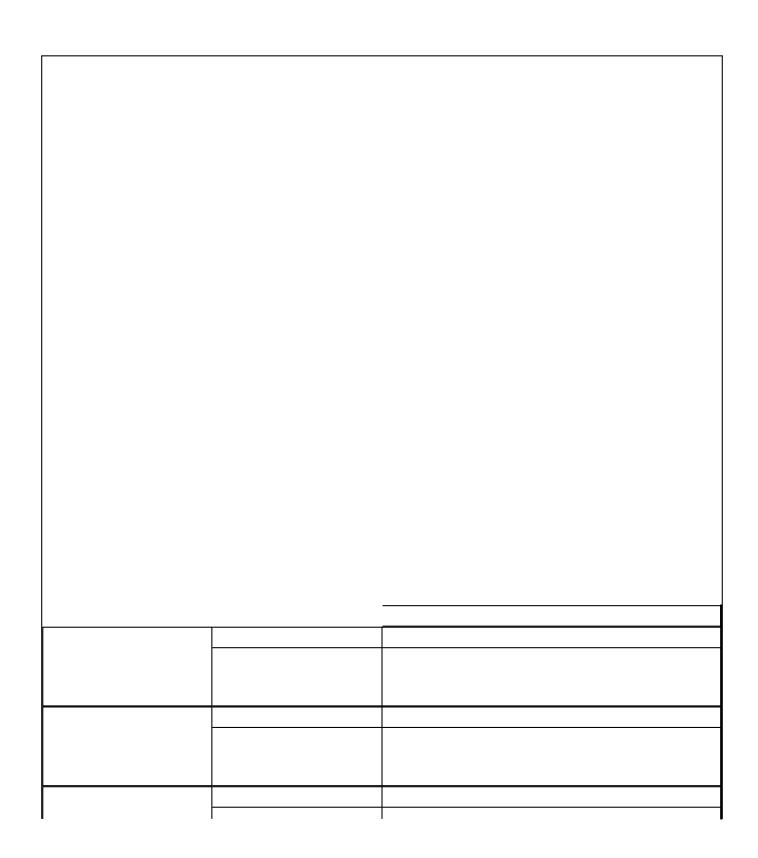
8YHJ]`g.

GY`YWfjcb`Zfca 'Uddfcl "'' \$']hYa g"

Gh XYbhg fYVV] j Y 'U 'bi a Yf]WJ `a Uf_ 'UbX Z ```gc `i h]cbg 'UbX 'U 'dfYdUfUhcfmih/gh'

5XX]h]cbU``XYhJ]`g.

@ghYb]b['HYghg'k]``VY'\Y`X'Xi f]b['`YWh fYg'cf'h hcf]U`g'cf'gdYW]U``mUffUb[YX'h]a Yg'Ug']bX]WUhYX']b'h\YWci fgY'gW\YXi 'Y'h]a YhUV'Y"



	Hi hcf]U`	A UHYfg'Uf]g]b['Zfca ``YWi fY"
		DfYgYbNJhjcbgʻZcfʻ@jghYb]b[ˈ@jgh]hYa gʻWcbhjbi YX"
K YY_'%\$.'&'5i[igh!'* 5i[igh	@YWn fY	F Yj]g]cb
- 0		7 cbh/bhf&)ı Ł'UbX'@jgh/b]b['f&)ı Ł'h/ghg'&'cZ&"
	Hi hcf]U`	A UMYfgʻUf]g]b[ʻZfca ``YWn fYʻUbX`fYj]g]cb"
		:]bU``dfYgYbHJHjcbg`UbX`ZYYXVUW <u>"</u> "
		7 ci fgY Yj U`i Uf]cb"

FYgci fWyg

DfYgWf]VYX F Ygci fWYg

 $6if_\c`XYf\c">"D"\c">"E\c">"D"\c">"DU`]gWU'f&$$*`cf``UhYf\c">"DU`]gWU'f&$$*`cf``UhYf\c">"DU`]gWU'f&$$$

A j XadV _ ge[U a` 1 Wz C l ZcfX l b]j Yfg]lmDfYgg" OZcf fYZYfYbWYO

 $\label{lem:hufig_bz} HUfig_]bzF"zf&$\%$L'H\Y'C|zcfX'<]ghcfmcZK YghYfb'A i g]Wf)"j c`gL'''fbj U]`UV`Y'ZfYY'j]U'h\Y'`]VfUfm'Ug'Ub YVcc_'fcb`]bYLL'''C|zcfX'|b]j Yfg]hmDfYgg$

FYWca a YbXYX FYgci fW/g

GYY'A ccX'Y

7ci fgY 9j U'i Uhjcb UbX 8Yj Y'cda Ybh

Ghi XYbhgʻUfYʻYbWci fU[YX'hcʻdfcj]XYʻZYYXVUW_hcʻ]a dfcj Yʻh\YʻWci fgYʻcfʻVYhhYfʻa YYhih\Y]fʻYl dYWfUh]cbg YUfʻm]bʻh\YʻhYfa žʻgcʻh\Uhih\YfYʻ]gʻhJa Yʻhcʻ]a d`Ya Ybh'W\Ub[Ygʻk\YfYʻdcgg]V`Y"ʻH\YʻdUWJb[ʻUbX'd`UWYa Ybh cZa UhYf]Uʻ`\UgʻVYYbʻfYghfi Whi fYXʻ]bʻfYgdcbgYʻhcʻZYYXVUW_"

Gi Va]gg]cb cZ5ggYgga YbhHUg_g Hi fb]h]b Gi Va]gg]cb

5 WUXYa]W<cbYghmUbX D`U[]Uf]ga

D`U[]Uf]ga `]g`i g]b['h\Y`k cfXg`cf`]XYUg`cZch\Yfg`UbX`dfYgYbh]b['h\Ya `Ug`mci f`ck b"`±hWJb`hU_Y`a Ubm Zcfa gžZfca `XY`]VYfUhY`W\YUh]b['hc`UWW]XYbhJ``mWcdm]b['Zfca `U`gci fWY`k]h\ci hUW_bck `YX[Ya Ybh'

IBGK [fcidg'd'U[]Uf]ga]bhc'h\Y'Zc``ck]b['WUhY[cf]Yg.

 $7 \text{ cdm}b[...i g]b[...h\Y.gUa Y.cf.j Yfmig]a] \Uf'k cfXg'hc'h\Y.cf][]bU''hYl h'cf']XYU'k]h\ci h'U\V_bck `YX[]b[...h\Y.cf][]bU''hYl h'cf']XYU'k]h'cf']$