

Gca a Yf'&\$&).; Yb'N'YbhXYW_h'5``!]bWi g]j Y!I f`Ui V'ZØf'9bhgdUbbi b[°

8]Y ; YbYfUh]cb N YbhXYW_h 5 ``!]bWi g]j Y!FY]gYb ZØf &\$&) . : fY]\Y]hž 9bhgdUbbi b['i bX bYi Y I f`Ui VghfYbXg']a ' \approx a c! Gh]`"



5 b hU`mUž'HØf_Y]'!'8 Yf'Gca a Yfi f`Ui V'&\$&) 'ghY\h'j cf'XYf'HØf i bX'Vf]b[h'Y]bYb'VYXYi hYbXYb'HfYbX'a]h'g]W\ž']bgVYgcbXYfY i bhYf''1 b[Yb'A YbgW\Yb"'@Ui h'Y]bYa '6Yf]W\h'j cb'k Uhgcb Ya dZ]bXYb'j]Y`Y'\$! [YbX`]W\Y']\fY'YfghYb'FY]gYb'c\bY']\fY'9`hYfb U`g'Y]bY'A O[`]W_Y]hž': fY]\Y]h'ni 'Yf`YVYb"'\$\DYb'ghY\Yb'_Y]bY A i gYi a gVYgi W\Y'cXYf'ghfYb[Yb'NY]hd`AbY']a 'K Y[/'ghUhhXYggYb [Yb]Y\Yb'g]Y'Ygž'Ui gni gW\`UZYb'i bX'ni 'dUfh]n]d]YfYbž VY]gd]Y`gk Y]gY'Ub'DUfhmg"

8]Y'l a ZfU[Y'j cb'9l dYX]U'nY][hž'XUgg'' \$'DfcnYbh'XYf'; YbYfUh]cb Nž'X]Y'nk]gW\Yb'%--+'i bX'&\$\%'[YVcfYb'k i fXYž'Y]b'dcg]h]j YfYg 6]`X'j cb'5``!]bWi g]j Y!<chY`g'\UVYb"'8]YgY'5bg]W\h'\YVh'g]W\ XYi h`]W\'j cb'XYf'À`hYfYb'A Y]bi b['UV'i bX']gh'ni bY\a YbX'VY] 'i b[Yb'FY]gYbXYb'Ub[Y_ca a Yb"'8Yf'HfYbXž'XYf'i fgdfØb[`]W\XYb'6cca Yf!; YbYfUh]cbYb'ni [YgW\f]YVYb'k i fXYž'Ybhk]W_Y`h'g]W\ni 'Y]bYf'Jcf`]YVYž'X]Y'Ui W\'Øb[YfY'FY]gYbXY'Ubn]Y\h"

5``!]bWi g]j Y'i bX'GhfYggfYXi _h]cb

9]bY I a ZfU[Y Yf[UV Ui W ž XUgg * % DfcnYbh XYf 6YZfU[hYb]a 5 hYf j cb %, V]g & (* \lambda \rangle fYb 5 \text{ }!]bWi g]j Y! < chY `g \text{ }Y j cfni [Yb" 6 Ygcb XYfg \text{ }Y f j cfni \ YVYb 'g]b X 'X]Y 'd fU_h]g W Yb 'J cfhY] `Y ž XYbb '(- DfcnYbh XYf 'HY] `bY\a Yf 'g W AhnYb ž XUgg 'g]Y 'b]W h a Y\f 'b U W F YghUi fUbhg 'gi W Yb 'a Øgg Yb " 8 Uf Ø V Yf '\]bUi g 'f Y Xi n] Yf Yb '(& DfcnYbh XYf '6 Y Zf U[hYb 'X Yb 'Ghf Ygg ž X U 'g]Y 'a]h 'Y]b Ya '5 \text{ }!] b Wi g]j Y! 5 b[Y V ch '_Y] b Y f 'Y] 'ni g Ahn \text{ }] W Y 'D \text{ }Ubi b[Yb 'j cfb Y\a Yb 'a Øgg Yb" Gi g Ubb Y '8 c d d ž Df Ygg Ygd f Y W Yf]b 'j cb '9 I d Y X] U ž 'V Yg W f Y] V h '5 \text{ }!]b Wi g]j Y 'U `g 'Y] b 'Fi b Xi a ! G c f[`cg! D U_Yh ž X Ug 'ni b Y\a Yb X 'ni Y] b Ya '; Y Z Ø \text{ }'j cb '@ I i g 'Z Ø f ' h b[Y F Y] g Y b X Y k] f X "

9]b k Y]hYfYg]bhYfYggUbhYg D\àbca Yb]gh'XYf HfYbX ni ∞ a c XYf ∞ mcZA]gg]b['Ci h "'@Ui h'Y]bYf I a ZfU[Y j cb : YK c X]fY_h k ØbgW\Yb g]W\, , 'DfcnYbh'XYf '6YZfU[hYb 'Y]bYb I f `Ui V]a ∞ a c! Gh] `z XYf 'g]W\ 'Ui Z'XYb 'VYk i gghYb '; Ybi gg XYg 'B]W\ hghi bg _cbnYbhf]Yfh i bX 'Y]bYb : c_i g 'Ui Z'9bhgdUbbi b[``Y[h" A Y\f 'U`g X]Y < À `ZhY 'XYf '6YZfU[hYb '[`Ui Vhz XUgg X]YgYf I f`Ui Vggh]` XUni VY]hf \(\hat{A}\) [hz GW\`UZ'ni 'j YfVYggYfb i bX 'Y b[ghY 'ni 'j Yff]b[Yfb "

@Ub[nY]hi f`Ui VY'i bX'UhhfU_h]j Y'FY]gYn]Y`Y

Ni bY\a YbX gi WXYb FY]gYbXY 'Ui WX 'bUWX '@Ub[nY]hi f`Ui VYbž k cVY] 'XYf 'HfYbX ']b 'F]WX hi b['5i ZYbh\ U`hY 'j cb 'a Y\f'U`g'j]Yf K cWXYb '[Y\h" '6Y `]YVhY 'FY]gYn]Y `Y 'ZØf '@Ub[nY]hUi ZYbh\ U`hY 'g]bX i bhYf 'UbXYfYa '8 ÀbYa Uf_ž 'GWX k YXYb 'gck]Y 'X]Y 'BcfX! 'i bX C ghgYY" '9]b 'k Y]hYfYf 'HfYbX 'bUa Ybg' 7cc `WUh]cb 'nY][hž XUgg]a a Yf a Y\f'A YbgWXYb 'HY] `Y 'XYg 'Gi a a Yfg']b 'FY[]cbYb 'a]h Ub[YbY\a YfYb '? `]a UVYX]b[i b[Yb'j YfVf]b[Yb'k c``Yb"

±0.6Yni ['Ui Z'5``!]bWi g]j Y!<chY`g'[Yk]bbYb': Yfbn]Y`Y'k]Y A Ui f]h]i g'i bX'A Yl]_c'Ub'Dcdi `Uf]hÀh"'6Y`]YVhY'5``!]bWi g]j Y! I f`Ui Vgn]Y`Y'ZØf'X]Y'; YbYfUh]cb'N'g]bX'5bhU`mUž'8U`Ua Ubž 6cXfi a ']b'XYf'HØf_Y]'gck]Y'A U``cfWUž'?fYhU'i bX'F\cXcg']b; f]YW\Yb`UbXž'[YZc`[h'jcb'<i f[\UXU']b'Ÿ[mdhYb"

CVk c\``a]``Ybb]U`gʻi bX'; YbʻNʻni bY\a YbX'5``!]bWi g]j Y!

5b[YVchY']bʻ6YhfUW\h'n]Y\Ybž'V`Y]Vh'X]Yʻ: fU[YʻcZZYbž'cVʻX]YgYf

HfYbX'k]f_`]W\'bYi ']gh"'9]bʻFY]gYUbV]YhYfž'&\UbbYgʻ6Yhnc`Xž

VYf]W\hYhž'XUggʻ5``!]bWi g]j Y!FY]gYbʻVYfY]hgʻ]bʻXYbʻ`YhnhYbʻ%) 'V]g

&\$'*J\\fYb'YI]gh]Yfh`\UVYb"'8]Yʻ5i ggU[Y_fUZh`XYfʻU_hi Y``Yb

I a ZfU[Ybʻ_ObbhYʻYXcW\'Y]b[YgW\fAb_h`gY]bž'XU'X]Y

HY]`bY\a YfnU\``j Yf[`Y]W\gk Y]gY`[Yf]b[`]gh"'B]W\hgXYghchfchn`nY][h

g]W\'Y]bʻ_`UfYfʻK i bgW\'bUW\'Y]bYa 'ghfYggZfY]YbʻI f`Ui V`a]h'a Y\f

: c_i gʻUi Zʻ9bhgdUbbi b[`i bX'; Ybi gg"

8 YhU]`g	
Cfh	5bhU`mUž'HØf_Y]
EiY``Yb	• kkk"kUhgcb"XY
	k k k "bcfXVUmYfb"XY

6Ygi WXYb G]Y i bg Ui Z Y]bY!fY]gY "XY