

!

#\$%&'()*\$*(!+,!- ./01203!45 6!7"89! !: *1;\$'01(!+,!5+<(.!|=+ '1?&!!
@A8A!B&0(!=+C>\$!'6 ;\$! !D&) %&3!=E!FFGA8H

!

"

!

] +>\$J! - '1*21%&>!4* ; \$0(10&(+ '!
- '+b\$2(J!6!) <>(H02&>\$!?'&(&H?'1; \$*!) +?>\$!+,!(. \$!6R\$(&!%+'\$!,<*2(1+*!&*?!U&^2+(+N121(/! *!6>g. \$1) \$'h0!
?10\$&0\$Q!

KGL : 5=!4*(\$' *&!O' &*(!aM3G8"!KA8"9LQ!
] +>\$J! - '1*21%&>!4* ; \$0(10&(+ '!
- '+b\$2(J!D+!R<1>?!&!0) &>>!2+) %<(\$!2><0(\$!,+!'!?\$; \$>+%1*0!) <>(H02&>\$!?'&(&H?'1; \$*!) +?>\$0!(+!<*?\$'0(&*?!
*\$<' +>+012&>! ?10+?'\$'0Q!

KIL 6) \$'12&*!- . /012&>!5+21\$(/!a"73888!KA8A8LQ!
] +>\$J!U+H4* ; \$0(10&(+ '!KU+HX'O&*!g\$'L!
- '+b\$2(J!D+! . +0!(. \$!U+*, \$' \$*2\$, +!' : *?\$'0'&?<&(\$! S +) \$*!1*!- . /0120!1*!A8A8!&(! : *1; \$'01(/!+,!5+<(.!
=>+'1?&Q!

!

+ #80' \$%&' () / *

"Q Y&*0\$*Hd '&R+C0[!163!; &*!5+\$0(!43!d<g) &*!] 3!d\$*02. !D3!900% : * ; 3!&*?! =& . >[\$!U3 D'&*0%+ '(!' +2\$00\$0!
&00+21&(\$?!C1(. !>/0+0+) &!2. >+'1?&!*?!%'+(+*!&22<) <>&(1+*3!(+!R\$!0<R) 1(((\$?Q!

AQ :) &'!6!] 3!E1+? / *+!Z3!900% : * ; 3!V<0210>1+!Y3!&*?!# \$) <' +!63!# +C*!5 / *?' +) \$H&, \$2(\$?! . <) &*!
2+'(12&!&0(' +2/(\$0!\$N. 1R1(!)) %&1'\$?4- H?&\$%\$*\$(U&^2+!010* &! *O!&*?!R1+\$* '\$O\$(1203!(+!R\$!0<R) 1(((\$?Q!

FQ V. &((&' &!63!Z \$ / \$'!Y3! - \$(\$'0!>1\$!E3!5 . & . !5!43!] +0\$!U!] 3! : >& . !d0!6! ?\$%>\$&' *1*OHR&0\$?!0\$0) \$*(&(1+*!
+,!2\$>0!&*?!&* & / 010!K#EH5U6 ^L3!0<R) 1(((\$?Q!

@Q 6 [(\$'!53! : >& . !d3!&*?! : >& . !6Q!4* ; \$0(10&(1*0!(. \$!'+>\$!+, !1*+01(+! "3@37H('10% . +0% . &(\$!' \$2\$(+ '0!1*(. \$!
&&(. +0\$* \$010!+, !6>g. \$1) \$'h0! ?10\$&0\$!(. ' +<0. !2+) %<(&(1+* &!) +?>\$! *O3!0<R) 1(((\$?Q!

7Q 6 ?\$+ / \$!D3!5 . & . !5!43!&*?! : >& . !d0!5 / 0(\$) &(12!&* & / 010!+, !R1+>+012&>!% '+2\$00\$0!' \$; \$&0!O\$*\$!2+H
\$N%' \$001+*!) +?<0\$0?'1; 1*0!%&(. C& / !? / 0' \$O<&(1+*!1*!6>g. \$1) \$'h0! ?10\$&0\$!601*O!&*?! #10\$&0\$!KA8A@LQ!

GQ =&b\$) 10!*!Y!63!d+*g&>\$g!d3!] +0\$*R\$'0!5!63! : >& . !d3!] \$?>\$'!d3!E&(1, !1 i 3!Z + ' +0!B!d3!B>! ^ & j &!4Q!
Z&O*\$!(12!] \$0+* &*2\$HO<1?&?!U&*2\$'!D. \$' &% / !] &?1+) 120!&*?!Z&2. 1*\$!E\$&' *1*O!Z +?>\$0!, +'!] \$0%+*0\$!
- '\$?12(1+*3!D+) +O' &% . /!KA8A@L!"8KML!"@FMH"@7@Q!

IQ - &00>12[!53! : >& . !d3!&*?! ` \$**\$R\$'O\$'!UQ!V1?1'\$2(1+* &! ? / 0' \$O<&(1+*!+, !0 / *% (12!O<&) &(\$!010* &>1*O!
&, (\$'!(&*01\$*(!) \$(&R+>12!, &!<' \$3!\$E1, \$!KA8A@LQ!

9Q : >& . !d3! ^ +0 / '\$; &!B3!&*?!5 / \$?&!] 3 - 1\$g+ "12. &**\$>!O&(\$! *!0<RH2+*?<2(&*2\$!>\$; \$>0!C1(. !%' \$00<' \$H!&*?!
; +>(&0\$H?&\$%\$*?\$(1+22<%&*2!\$03!Y+<' * &!+, !V1+>+012&>!U. \$) 10(' /!KA8A@L!F88K@L!"8I"7GQ!

MQ 5 . &!5!43! - &' [\$'!43!900% : ! ; 3 &*?!# \$) <' +!63!6 @8!&*?!6 @A!+>10+) \$'0!, +') !(&*01\$*(!&*?!%'010(\$*(!
%+ '\$0! ?1, , \$' \$*(!1) \$!\$; +<(1+*0!&*?!(+N121(1\$03!5<R) 1(((\$?!#X4!
(%0JTT?+1Q+ 'OT"8Q" "8"TA8AAQ8@QAMQ@M8"8"Q!

"8Q B; \$' &\$'(0! i 3!D. &%& / 1&! - 3!#<' /!53! - &%\$! ^ 3!B1(\$) &**!53!] +<00&!B3!900% : * ; 3!&*?!] +0\$!UQ!] 3!4*C&'?!
+%\$' &(1+*!+, !^ VU\$"!<%+*!R'1\$, !2. \$) 12&!102. \$) 1&!%'+) +(\$0!&0(' +2/ (12! ^ &+!> &?1*O!&*?!>+00!+, !6D- !1*!

!

!

.+) \$+0(&010!R\$(C\$\$*!2+'(12&>!&*?! .1%%+2&) %&>!&0(' +2/(\$0!&*?!1(0!1) %&2(!+*!R1+\$*\$'O\$(1203!

!

!

AMQ -\$!\$g!U3!Z1(!D3!`&0\$2[\$!=3!Z\$10>!d3!`+/\$!S3!Z<02.+>!Z3!&*?!900%:* ; Q!Z\$2.&*10)!+,!,1R'l>!&*?!
0+><R>\$!+>10+) \$'!,+') &(1+*! !*&) />+1?!R\$(&!&*?!.\$*!\$00!C.l(\$!>/0+g/) \$!%' +(\$1*03!Y+<'*&>+ ,!- ./012&!
U.\$) 10(' /!V3!KA8"ML!"AFKAIL!7GI9H7G9Mq

!

!

GAQ

!

!

Z+?>1*03!D.\$!X%\$*!^\$<'>+O/!Y+<'&>3!4*(\$'*&(1+*&!Y+<'&>+!,!U+) %<(&(1+*&!Z\$(. +?03!V1+,&R'12&(1+*3!
\$E1,\$3!4*(\$'*&(1+*&!Y+<'&>+!,!5('<2(<'&!&*?!U+) %<(&(1+*&!V1+>+O/3!Y+<'&>+!,!] &) &*!5%\$2('+02+% /3!
Y+<'&>+!,!V1+% . +(+*1203! ^ \$<' +* &> ! ^ \$(C+' [03!(. \$!X%\$*!^\$<'>+O/!Y+<'&>3! ^ \$<'&>!] \$0\$*\$'&(1+*!
] \$0\$&'2. q!

5\$*&(+!&(! : 5=! =&2<>(/!5\$*&(\$3!8MTA8AAH!% '\$0\$*(!

Z\$) R\$'!+,! : 5=! - . /0!20!U+)) 1(((\$\$,+'!#\$\$&'() \$*(! S \$R01(\$!#\$\$; \$>+%) \$*(3!8MTA8AAH% '\$0\$*(!

Z\$) R\$'!+,! : 5=! - . /0!20! =&2<>(/!6 ? ; 10+ '/!U+)) 1(((\$3!89TA8"9H87TA8A"!&*?!8MTA8AFH% '\$0\$*(!

U. &1'3!4*,+') &(1+*3!U+) %<(1*03!&*?!U+)) <*12&(1+*!U+'\$!+,! : 5=! - &*?\$) 12!] \$0%+*0\$!] \$0\$&'2. ! ^ \$(C+' [3!
A8A8!\!A8A"!



!

!

IQ 4*(' + ? < 2(1+*!(+!U+) %<(&(1+*>!- . /0120!K- . #!>\$; \$>!U+<'0\$!f!- ` c!7"7@UL3!(&<0. (!0\$; \$*!(1) \$0!0! *2\$! A8" FQ!

9Q 6 ? ; &*2\$?!U+) %<(&(1+*>!- . /0120!K- . #!>\$; \$>!U+<'0\$!f!- ` c!7"7GUL3!(&<0. (!,1; \$!(1) \$0!0! *2\$!A8"@Q!!

MQ Z &(. \$) &(12&!Z\$(. +?0!1*!- . /0120!K : *? \$'O'&?<&(\$!>\$; \$>!U+<'0\$!f!- ` c!F""FL3!(&<0. (!0!N!(1) \$0!0! *2\$! A8"GQ!

"8Q d\$*\$'&>!- . /0120!4!KCr6>0\$R'&LK : *? \$'O'&?<&(\$!>\$; \$>!U+<'0\$!f!- ` o!A87FL3!5<)) \$'!A8"@Q!

""Q ^ \$ < ' &!U+*(' +>!B*O!*\$ \$'! *O!K- . #!>\$; \$>L3!(&<0. (!&!(. \$!- \$**0/> ; &*1&!5(&(\$! : *1; \$'0!(/3! = &>>!A88MQ!

X*>!*\$!U+<'0\$0!# \$; \$>+%\$?!&*?!D&<0. (!

"AQ U+) %<(&(1+*>!- . /0120!K : *? \$'O'&?<&(\$!>\$; \$>!U+<'0\$!f!- ` c!@"7"UL3!?\$; \$>+%\$?!*!5<)) \$'!A8"G3! (&<0. (!!*! = &>>!A8"GQ!

"FQ X*>!*\$!U+<'0\$!+*!4*(' + ? < 2(1+*!(+!U+) %<(&(1+*>!- . /0120!K- . #!>\$; \$>!U+<'0\$!f!- ` c!7"7@UL3! ?\$; \$>+%\$?!*!5<)) \$'!A8"G3!(&<0. (!!*! = &>>!A8"GQ!

U+<'0\$0!D&<0. (!V\$, + '\$! : 5=!

"@Q D. \$') &!&*?!5(&(10(12&>!- . /0120!K : *? \$'O'&?<&(\$!>\$; \$>3! = &>>!A888L!

"7Q 5%\$2!&>!D+%120!1*!^ < 2\$&'!- . /0120!K : *? \$'O'&?<&(\$!>\$; \$>3!5% '1*O!A88"L!!

"GQ 6>0\$R'&!&*?!U&2<<0!V&0\$?!- . /0!>\$; \$0.2(!&) 0.2(*?!U&) 0.2?.2(R'&) 1(BI5000<!` Tm/TT2*(<>) 0.2(<0) -0.2(!V&) 0

!

!

IQ WIN!*O!` &*3!Z\$?12&>!- ./0120!ZQ5Q!K=&>!A8" I!\!5%'1*O!A8A8L!

9Q U.'10(+%. \$!D12.&2\$[3!Z\$?12&>!- ./0120!- . #!K5<)) \$!A8"7!\!&>!A8"ML!

MQ ^1[>&0!` mR\$>3!- . #3!-+0(?+2(+&!>] \$0\$&'2. \$!KZ&'!A8"7!H!5<)) \$!A8"GL!

"8Q -&('12[!D+O>l&3!- ./0120!- . #!K=&>!A8"F!\!5%'1*O!A8"9L!

""Q Z<.&))&?!5 .&,1jH :>H` &00&*3!Z\$?12&>!- ./0120!- . #!K5%'1*O!A8"G!\!5%'1*O!A8"9L!

"AQ 5&\$?16 .))&?!Z\$?12&>!- ./0120!- . #!K5%'1*O!A8"G!\!5%'1*O!A8"ML!

"FQ Z12.&\$!&0&*+3!- ./0120!ZQ5Q!K5%'1*O!A8"@!\!5%'1*O!A8"9L!

"@Q ='&*2102+!5&*+(+03!- ./0120!ZQ5Q!K=&>!A8"7!\!5%'1*O!A8"9L!

"7Q i &'0!_>? [&) %3!Z5!4*(\$*!, '+) ! : *1;\$'0!(/!+,!DC\$*(\$!^\$(. \$'>&*?0!KZ&/!A8"!H!^+; !A8A"LQ!

: *? \$'O'&?<&(\$!5(<? \$*(0!

"Q 5(\$,&*!=\$1\$'3!- ./0120! : *? \$'O'&?<&(\$!K5<)) \$!A8AA!\!- '\$0\$*(L!

AQ B) l>/!B!_&*! S 1\$>\$3!- ./0120! : *? \$'O'&?<&(\$! : *1;\$'0!(/!+,!D&) %&!K5<)) \$!A8A@!\!- '\$0\$*(L!

FQ # \$;1*!d&1*\$'3!- ./0120! : *? \$'O'&?<&(\$!K5%'1*O!A8AF!\!&>!A8AFL!

@Q B'12!` + *,\$2[3!- ./0120! : *? \$'O'&?<&(\$!K5%'1*O!A8AF!\!&>!A8AFL!

7Q U&'>+!*\$! S &'?3!- ./0120!] B : !0(<? \$*(!, '+) !D. \$!U+>>\$0\$!+,! S ++0(\$'3!X` !K5<)) \$!A8AAL!

GQ D/>\$'!` <>>3!- ./0120! : *? \$'O'&?<&(\$!K5%'1*O!A8A"!H!5%'1*O!A8AAL!

IQ Anthony Gifford3!- ./0120! : *? \$'O'&?<&(\$!K=&>!A8A"!H!5%'1*O!A8AAL!

9Q Zenzele Thomas3!- ./0120! : *? \$'O'&?<&(\$!K=&>!A8A"!H!5%'1*O!A8AAL!

MQ U.&0\$!] < ,3!- ./0120! : *? \$'O'&?<&(\$!K5%'1*O!A8A8!H!&>!A8AAL!

"8Q 6>\$N!Y! 60+0(+3!- ./0120! : *? \$'O'&?<&(\$!K=&>!A8A8!H!&>!A8AAL!

""Q B(.&*!` !=>\$) 1*03!- ./0120!] B : !0(<? \$*(!, '+) !Z1?>?>\$R</!U+>>\$0\$3!_D!K5<)) \$!A8A"L!

"AQ S l>l&) !-&*(\$3!- ./0120! : *? \$'O'&?<&(\$!K5%'1*O!A8"M!H!5%'1*O!A8A8L!

"FQ]+0&'1+!` \$'&*?>\$g3! : *? \$'O'&?<&(\$! - ./0120!] B : !0(<? \$*(!, '+) !5+<(. C\$0(\$! : *1;\$'0!(/3!D s !K5<)) \$!A8"ML!

"@Q U+>1*!D'\$;+!'!` <*(>\$/3!- ./0120! : *? \$'O'&?<&(\$!K5<)) \$!A8"M!H!5%'1*O!A8A8L!

"7Q Y+. *!c . +<3!- ./0120! : *? \$'O'&?<&(\$!K5%'1*O!A8"M!H!&>!A8"ML!

"GQ d'&2\$!E+/?3!U\$>>&'!&*?!Z+>\$2<&'!V1+>+0/! : *? \$'O'&?<&(\$!K5%'1*O!A8"9!\!5%'1*O!A8"ML!

"IQ i &f[(d) 5.92cm/TT9!Tf(!) TjETQq0.24000.2412589.92cm.24125892589.92c.23'059 s c q ITf(!) TjETQq0.24000.24125

!

!

AAQ 5&*1) !] & .) &*3!U. \$) 12&>!B*01*\$ \$'1*0! : *?'\$'O'&?<&(\$!K5%'1*0!A8" I!\!5%'1*0!A8"9L!
 AFQ] +R\$'(15%'&O<\$3!- . /0120! : *?'\$'O'&?<&(\$!K=&>!A8" I!\!5%'1*0!A8"9L!
 A@Q 6*(. +*/! i !U>\$&'3! : *?'\$'O'&?<&(\$!- . /0120!] B : !0(<?'\$*(!, '+) ! i 1*0! : *1;\$'01(/3!D^!K5<)) \$'!A8" IL!
 A7Q B)) &!5(\$% .&*3! ^ 10. !52. ++>!5(<?'\$*(!K87TA8" I!\!8MTA8" IL!
 AGQ V'&*(+*! ` <., 0(<(>\$'3!- . /0120! : *?'\$'O'&?<&(\$!K=&>!A8"@!\!&>!A8"GL!
 AIQ B ;&*!E1(<(\$3!- . /0120! : *?'\$'O'&?<&(\$!K5%'1*0!A8"G!\!S 1*(\$'!A8"GL!
 A9Q D/>\$'!4+'!gg+3!- . /0120! : *?'\$'O'&?<&(\$!K5<)) \$'!A8"7!\!&>!A8"GL!
 AMQ U+<(+*!Y+. *0+*3! : *?'\$'O'&?<&(\$!- . /0120!K=&>!A8"7H!5<)) \$'!A8"GL!
 F8Q 5&) <\$!Z+*(0+) \$' /3! : *?'\$'O'&?<&(\$!- . /0120!] B : !0(<?'\$*(!, '+) ! ^ \$C!Z \$N12+!D\$2. !K5<)) \$'!A8"7L!
 F"Q D. &(2. \$'!Z+003! : *?'\$'O'&?<&(\$!- . /0120!K5<)) \$'!A8"7L!
 FAQ #&*!\$>!V+*!i>>&3! : *?'\$'O'&?<&(\$!- . /0120!K=&>!A8"7L!
 FFQ] +R\$'(!E+0&*3! : *?'\$'O'&?<&(\$!- . /0120!K=&>!A8"FH!5%'1*0!A8"7L!
 F@Q U+'\$'!/V&(. <'03! : *?'\$'O'&?<&(\$!- . /0120!K=&>!A8"FH!5<)) \$'!A8"@L!
 F7Q U&(. &'1*\$!5. 1%03! : *?'\$'O'&?<&(\$!- . /0120!] B : !0(<?'\$*(!, '+) ! X. 1+!5(&(\$! : *1;\$'01(/!K5<)) \$'!A8"7L!
 FGQ #&*!10. ! ^ &0&*3! : *?'\$'O'&?<&(\$!V1+) \$?'12&>!52!\$*2\$0!K=&>!A8"@!H!5%'1*0!A8"7L!
 FIQ 6>\$N&*?'\$!51?+.) 3! : *?'\$'O'&?<&(\$!V1+) \$?'12&>!52!\$*2\$0!K=&>!A8"@!H!5%'1*0!A8"7L!

6<>)*!KU+H&?;10\$?!&!(. \$!- \$**0/>;&*1&!5(&(\$! : *1;\$'01(/L!

"Q o1*!&! S \$!3!- . #!1*! ^ \$<'&>!B*01*\$ \$'1*0!K=&>!A88I!H!5%'1*0!A8"FL!

Z\$) R\$'!+,!(. \$!- . #!(. \$010!2+)) 1(((\$0J!

"Q ^&R1>&!V<0. ' &3!# \$%&' () \$*(!+,!- . /0120!

AQ ` &,lg&!c&. '&!] &R3!# \$%&' () \$*(!+,!U. \$) 10(' /!

FQ ^+. &!6>g&. '&*!3!# \$%&' () \$*(!+,!- . /0120!

@Q 6R?<>. &[1] !6>0&1,3!# \$%&' () \$*(!+,!B>\$2('12&>!B*01*\$ \$'1*0!

7Q 6>!6>b<) &. 3!# \$%&' () \$*(!+,!B>\$2('12&>!B*01*\$ \$'1*0!

GQ U. &) &*! ^ 1/&*0+?&3!# \$%&' () \$*(!+,!- . /0120!

IQ Y&0+*!Z&0(3!# \$%&' () \$*(!+,!- . /0120!

9Q Y\$'\$) /!V&'(+*3!# \$%&' () \$*(!+,!- . /0120!

MQ 6' /&!U. 1*(&3!# \$%&' () \$*(!+,!- . /0120!

"8Q E1&*0!- \$*0,\$!3!# \$%&' () \$*(!+,!- . /0120!

""Q Y&) \$0! i '<2g\$[3!# \$%&' () \$*(!+,!- . /0120!!

"AQ Baderaldeen Altazi, Department of Physics, Moffitt Cancer Center (graduated 2017)!

"FQ D&(1&*!&!Z1(13!# \$%&' () \$*(!+,!- . /0120!KO'&?<&(\$?!A8" IL!

!

!

"@Q 6) &*!U.&C>&3!#\$%&'() \$*(!+,!B>\$2('12&>!B*0!*\$'1*0!KO'&?<&(\$?!A8" IL!

"7Q Z \$*(+'!Z<&b3!#\$%&'() \$*(!+,!- ./0120!KO'&?<&(\$?!A8"G)!

3(-.,.)\$. /C D (,E/ : (2/*F,B%)'G.'**

"Q!!!U+H+'O&*!g\$?!6 - 5!U+*, '\$*\$2\$, +'! : *? '\$'O'&?<&(\$! S +) \$*!1*!- ./0120!&(! : 5=3!A8A8!!

AQ!!!X'O&*!g\$?!&!&(!

!