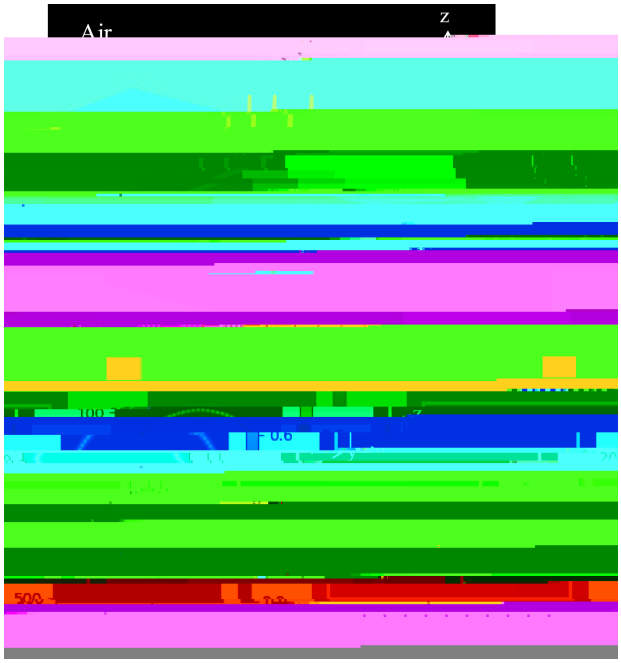

de e a e o he nea and non nea d pe e effe , h a he e and F D effe , δ he no ma ed f eq en de n ng e een m o ng e onan e f eq en and he np gh a e eng h. n_{ke} on a n he e on on of o h on and g aphene, and de ned n (4):

$$n_{ke} = \frac{1}{\sqrt{\sigma\beta\Gamma_0}}(\gamma_{ke} + \gamma_{ke}^{G}) \tag{4}$$

he e he γ_{ke} , γ_{ke}^{G} pa ame e a e de ned a pe (5), (6):

$$\gamma_{ke} = \frac{\omega_0 c n_{2,}^{ma}}{V_{ke}} \tag{5}$$

$$\gamma_{ke}^{G} = \frac{\sigma_{3,Im}^{ma}}{V_{ke}^{G}{}^{2}_{0}} \tag{6}$$

$n_{2,}^{ma}$ he e oef en of on and $\sigma_{3,Im}^{ma}$ he h d- o de non nea ond of g aphene h h an f he eng h of he e non nea n ea h ma e a . $\sigma_{3,Im}^{ma}$ a - a ed ng $n_{2,G}^{ma}$ fo

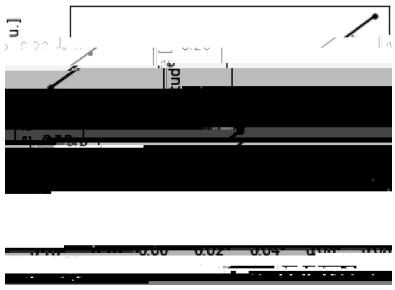

Fig. 5. t p t p ke amp t de a a f t n on of np t pe t a on amp t de t a ng a h e ho d eha o .

e a , fa o, a ha he e , no dea , p k ng de e ha ea, e e h ng e, e a o, a me . The e a e add - ona ha enge, n o h op oe e on a e a a -op a app oa he, o ea po a he f p e. o op oe e on de e, , e d d no on, de he, peed m , d e o pa a n e e on nk ha an o ene k he ne on p o e, , ng , peed. Th, ma e add e, ed he e ogeneo , n eg a on h a h p a p- h p ond ng [70] a o ng fo , e fo h gh- peed e e on omponen, h a o pa a pa h a . m a , n a -op a de e, , op a po e a ad- a , a on e n, a op a po e , ne a o a ea h

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Paul R. Prucnal (fe F e o , I) e e ed he A.B. deg ee n ma hema and ph (*summa cum laude*) f om Bo do n o ege, B n k, A, and he ., Ph . and Ph.D. deg ee n e e a eng nee ng f om o m a n e M , M o k, A. A f e h, Do o a e, he jo ned he fa h o m a n e , he e he , / a a em e of o m a Rad a on a o a o , he pe fo med g o nd eak ng o k n D A and L M