PZz\_© gvÎv `k©b

Avãyj¨vn Avw`j gvngy`

Avgvi f~wgKv

wØgvwÎK cÖvYx jy‡Kv‡jI wÎgvwKÎ cÖvYx †`L‡Q|

c„w\_exi eyK eivei nvuU‡j gvÎvi cwieZ©b †evSv hv‡e bv|

f~wgKv...

wPÎ-1

k~b¨ Aa¨vq

gvÎv Kv‡K e‡j?

ïiæ Kievi Av‡M †R‡b wb‡Z n‡e *gvÎv* kãUv w`‡q Avgiv Kx †evSv‡Z Pvw”Q? mnR K\_vq, gvÎv n‡jv we¯Ív‡ii GKwU cwigvc| gv‡b †h wewfbœ w`‡K e¯‘wU we¯Í…Z \_vK‡Z cv‡i| Ab¨ K\_vq, e¯‘wUi ˆ`N¨©, cÖ¯’ I D”PZvi cwigvc| hw` e¯‘wU nq w\_ªwW ev wÎgvwÎK (three-dimensional)| Z‡e gvÎvi †Zv Avm‡j †kl †bB| ¯’vb-Kv‡ji evB‡iI A‡b‡K gvÎv wb‡q gvZvgvwZ K‡ib| we‡bv`b‡K›`ª¸‡jvq †`L‡eb †jLv \_v‡K wm·-wW, GgbwK bvBbwW †kvI bvwK †`Lvq| †mLv‡b Avm‡j †hUv nq, aiæb, wd‡j¥ e„wó n‡”Q, Zvn‡j Avcbvi Mv‡qI e„wó covi e¨e¯’v Kiv n‡jv| ev wd‡j¥i PwiÎ`‡i g‡Zv Avcbvi emvi AvmbwU‡KI bvov‡bv n‡jv| Gfv‡e wewfbœ Abyf~wZ hy³ K‡i Zviv GK GKwU gvÎv evwo‡q †bq|

‡KD PvB‡j gvÎv wb‡q AviI bvbvbfv‡e gvZvgvwZ Ki‡Z cv‡ib| †hgb Avcbvi wPšÍvi gvÎv ev Mv‡qi M‡Üi gvÎv| wKš‘ GB eB‡q Avgiv Gmb gvÎv wb‡q K\_v ejwQ bv| Zvn‡j †Kvb gvÎv wb‡q K\_v ejwQ? GKwU mij R¨vwgwZK D`vniY wPšÍv Kwi| GKwU we›`yi †Kv‡bv gvÎv †bB| gv‡b †Kv‡bv w`‡KB Gi †Kv‡bviKg we¯Ívi †bB| G‡K PvB‡j Avgiv k~b¨gvwÎK (wR‡iv-wW) e¯‘ ej‡Z cvwi| ev ej‡Z cvwi Amxg ÿz`ª GKwU e¯‘| ïay ÿz`ª ej‡j Avm‡j †mUv Avi k~b¨gvwÎK n‡e bv| KviY hZB ÿz`ª †nvK, Zvi mvgvb¨ ˆ`N¨©, cÖ¯’, ev D”PZv \_vK‡eB| GRb¨ ej‡Z n‡e A‡bK A‡bK... †ewk ÿz`ª| Amxg cwigvY ÿz`ª| Amxg me‡P‡q eo (!) msL¨v| d‡j, Amxgevi ÿz`ª ej‡j we›`ywUi Avi Aw¯ÍZ¡B (gv‡b Avm‡j) \_v‡K bv|

GK wgwbU! GKUy Av‡M Kx †hb ejjvg, Amxg me‡P‡q eo msL¨v? †**Kv‡bvfv‡eB bv**| Amxg hw` Avm‡jB †Kv‡bv msL¨v n‡Zv, Z‡e Zvi mv‡\_ AviI 1 †hvM K‡i †Zv Zvi †P‡q eo msL¨v cvIqv hv‡e| Zvn‡j Amxg Kxfv‡e me‡P‡q eo msL¨v nq? Amxg Avm‡j †Kv‡bv msL¨vB bv| GUv wbQK GKwU aviYv| hv Avgv‡`i‡K G‡Ki ci GK wnmve K‡i †h‡Z mnvqZv K‡i|

Amxg wb‡q GB D‡Ïk¨nxb K\_vi Avm‡j GKwU D‡Ïk¨ Av‡Q| GB †h GZÿY Amxg wb‡q K\_v ejjvg, G‡Z K‡i Avgv‡`i gvÎvÁvb GKUzI ev‡owb| wVK †hb k~b¨gvwÎK e¯‘i g‡Zv!

hvB †nvK, gvÎv GK (1) evovB| Zvn‡j Avgiv cve GKwU jvBb ev †iLv, hvi ïay ˆ`N¨© Av‡Q| cÖ¯’ ev D”PZv †bB| gv‡b Iqvb-wW (1D) ev GKgvwÎK e¯‘| Avi †iLv wKš‘ ˆZwi nq A‡bK¸‡jv we›`yi mgš^‡q| GLb K\_v n‡jv we›`yi wb‡Ri †hLv‡b †Kv‡bv ˆ`N¨© †bB, †mLv‡b A‡bK we›`y‡Z ˆZwi †iLv ˆ`N¨© †cj †Kv\_vq? †m Av‡iK Kvwnwb| Ab¨ mg‡qi R‡b¨ †Zvjv \_vKj| GKwU †iLv ïay GKwU w`‡K we¯Í…Z \_v‡K| GKwU †jLvi jvB‡bi g‡Zv| co‡Z co‡Z mvg‡b ev †cQ‡b Avmv hvq| Dc‡ii jvB‡bi Aÿi †\_‡K bx‡Pi jvB‡bi Aÿ‡i wM‡q wKQz †evSv hv‡e bv| ev GK c„ôvi Aÿ‡ii mv‡\_ Aci c„ôvi Aÿi‡K wgwj‡q co‡Z †M‡jI †Kv‡bv jvf †bB|2 gv‡b †iLv Avm‡j GKgvwÎK| Avi Zj n‡jv wØgvwÎK| GKwU †Uwe‡ji IciUv wPšÍv Kiæb| D”PZv ev` w`‡j GUv wØgvwÎK GKwU wRwbm| kyay ˆ`N¨© Avi cÖ¯’ Av‡Q| wKš‘ hw` GKwU eB ev B‡Ui K\_v wPšÍv K‡ib, Zvn‡j wÎgvwÎK n‡q †Mj| Gi ˆ`N¨©, cÖ¯’, D”PZv wZb‡UB Av‡Q|

wPÎ-2

Ic‡ii wPÎ‡K PvB‡j Avgiv wfbœfv‡e wPšÍv Ki‡Z cvwi| evu †\_‡K Wv‡b h\_vµ‡g Avcbvi Abyf~wZ, j¤^v K‡i evov‡bv Avcbvi nvZ, Avcbvi Qvqv I Avcwb wb‡R| Abyf~wZi †Kv‡bv gvÎv †bB| ZvB GUv n‡jv k~b¨gvwÎK| nvZ Avm‡j wÎgvwÎK n‡jI GLv‡b Avgiv G‡K †iLvi g‡Zv K‡i fvewQ| Avi Qvqv †Zv Avm‡jB wØgvwÎK| Avi Avwg-Avcwb †Zv wÎgvwÎKB|

Avgv‡`i gnvwek^‡K †`‡L wÎgvwÎK g‡b n‡”Q (AvcvZZ)| KviY wÎgvwÎK e¯‘i g‡ZvB Avgiv wZbwU ¯^vaxb w`K cvw”Q| DËi-`wÿY, c~e©-cwðg I Dci-bxP| G wZbwU w`‡Ki mgš^‡q Ab¨ †h-‡Kv‡bv w`K evwb‡q †bIqv hvq| wKš‘ †Kv‡bv GKwU w`K ev` w`‡j †Kv‡bv e¯‘i eY©bv Am¤ú~Y© †\_‡K hv‡e|

Z‡e ¯’vb-Kvj wKš‘ PZzg©vwÎK| GLv‡b PZz\_© gvÎv n‡jv mgq| ¯’v‡bi gvÎv bv n‡jI G‡K gvÎv ejvi KviY n‡jv GwUI Avm‡j cwigv‡ci GKwU we¯Ívi| mgq Avm‡j `ywU NUbvi gv‡Si e¨vwß cÖKvk K‡i| GKUz Av‡M Avgiv Avgv‡`i wPšÍv‡K k~b¨gvwÎK e‡jwQ| wKš‘ wPšÍv Ki‡Z †Zv GKUz n‡jI mg‡qi cÖ‡qvRb| Zvn‡j †Zv wPšÍv‡K GKgvwÎK AšÍZ ej‡Z nq| ej‡Z Amyweav †bB| Z‡e g‡b ivL‡Z n‡e, †mUv ¯’v‡bi †Kv‡bv gvÎv bq| Avgv‡`i g~j Av‡jvPbv wKš‘ ¯’v‡bi PZz\_© gvÎv wb‡q| ZvB mgq gvÎv n‡jI Avgv‡`i Av‡jvPbvq †mUv AcÖvmw½K| GUv ˆ`N¨©, cÖ¯’ I D”PZvi g‡ZvB Av‡iKwU m¦vaxb gvÎv| G wZbwUi mgš^‡q ˆZwi bq| Ckvb †KvY ejv nq DËi-c~e© †KvY‡K| gv‡b GwU DËi I c~e© w`‡Ki mgš^‡q ˆZwi| Avgv‡`i PZz\_© gvÎv Ggb n‡e bv|

ZvwË¡K c`v\_©we`¨vq eZ©gv‡b RbwcÖq bvg w÷ªs w\_Iwi| cÖK…wZi †gŠwjK ej¸‡jv‡K GKwU m~‡Îi gva¨‡g cÖKvk Kivi B”Qv †\_‡K Rb¥ GB Z‡Ë¡i| GB ZË¡ Abymv‡i gnvwe‡k^i gvÎvi msL¨v wZ‡bi †ewk| ZË¡wU ej‡Q gnvwe‡k^ ¯’v‡bi gvÎv Av‡Q m¤¢eZ bqwU| mg‡qi GKwU gvÎv wb‡q †gvU `kwU gvÎv| w÷ªs w\_Iwii Avevi A‡bK¸‡jv ms¯‹iY Av‡Q| mycviw÷ªs w\_Iwii cvuPwU ms¯‹iY‡K Avevi GKwUgvÎ m~‡Îi ewntcÖKvk g‡b Kiv nq| †mB m~ÎwUi bvg Gg-w\_Iwi| GB Z‡Ë¡ Avevi †gvU gvÎvi msL¨v `‡ki e`‡j GMv‡iv| Z‡e w÷ªs w\_Iwii cÖv\_wgK iƒc Abymv‡i †gvU gvÎvi msL¨v wQj 26| gv‡b 25 wU wQj mg‡qi gvÎv|

cÖ\_g `„wó‡Z w÷ªs ZË¡‡K Lye A™¢~Z g‡b nq| †hLv‡b Avgiv †`L‡ZB cvw”Q, gnvwek^ wÎgvwÎK, †mLv‡b AviI GZ¸‡jv gvÎvi Aw¯ÍZ¡ Kxfv‡e gvbv hvq?

Lye m¤¢e Ab¨ gvÎv¸‡jv Av‡Q †Pv‡Li Avov‡j| nq‡Zv †mB gvÎv¸‡jv LyeB ÿz`ª| †eu‡K Av‡Q e„ËvKv‡i| bx‡Pi wmwjÛviwUi K\_v wPšÍv Kiæb| n‡Z cv‡i Avgv‡`i †Pbv gvÎv¸‡jv Gi ˆ`‡N¨©i g‡Zv| Avi A‡Pbv gvÎv¸‡jv Gi cwiwai g‡Zv| cwiwa Lye ÿz`ª, wKš‘ ˆ`N¨© Amxg| A‡Pbv gvÎv¸‡jv Lye †QvU n‡j G‡`i‡K Avgiv †`L‡Z cve bv| Avgiv Gme gvÎv eivei PjvPj Ki‡jI †mUv eyS‡Z cvie bv|

wPÎ-3

Aek¨B gvÎv¸‡jv AviI bvbvb Dcv‡q Avgv‡`i †Pv‡Li Avov‡j \_vK‡Z cv‡i| GKUz Av‡M †hUv ejjvg Zvi bvg ms‡KvPb (compactification) g‡Wj| gv‡b evwK gvÎv¸‡jv msKzwPZ aiv nq|

‡bvU

1. G we¯Ívi cwimsL¨v‡bi we¯Ívi (dispersion) bq wKš‘|
2. GB K\_vUv †Kb ejjvg GKevi fveyb| Avm‡j Avgv‡`i cwiwPZ gvÎv¸‡jv n‡jv ˆ`N¨©, cÖ¯’ I D”PZv| eB‡qi jvBb a‡i mvg‡b hvIqvi gv‡b cÖ¯’ eivei GwM‡q hvIqv| ˆ`N¨© eivei hvIqv gv‡b GK jvBb †\_‡K Av‡iK jvB‡b P‡j hvIqv| Avi eB‡qi D”PZv eivei wPšÍv Ki‡j GK c„ôv †\_‡K Av‡iK c„ôvq P‡j †h‡Z n‡e| eBwU eÜ Av‡Q a‡i wb‡j GUv eyS‡Z myweav n‡e|

m~Î

* https://en.wikipedia.org/wiki/Superstring\_theory