



I.P.R. Outreach Presents



"Plasma Khawvel Mak Tak Mai Chu"
Comic Series No. 1

**"MATTER
NIHPHUNGTE"**



A Thuphung, Thawnthu
Leh Script
Ravi A V Kumar

Mizo Tawng
Samuel Lalmalsawma

Artwork &
Layout

Ansh G Trivedi

MATTER NIHPHUNGTE

"Plasma Khawvel Mak Tak Mai Chu" Comic Series No. 1

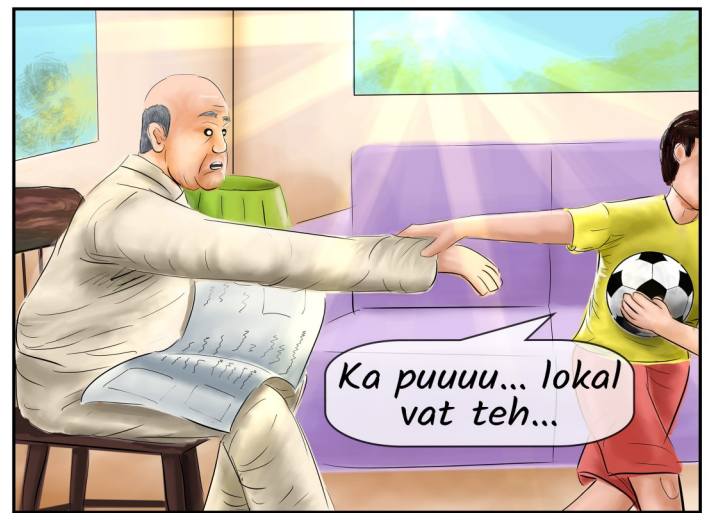
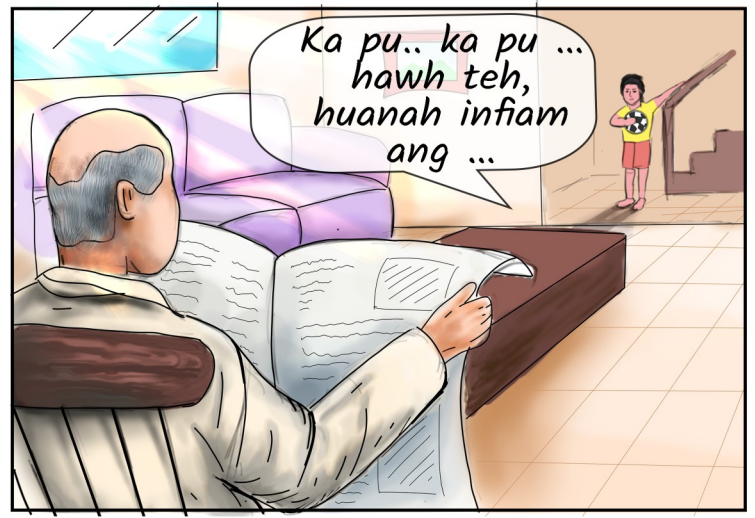
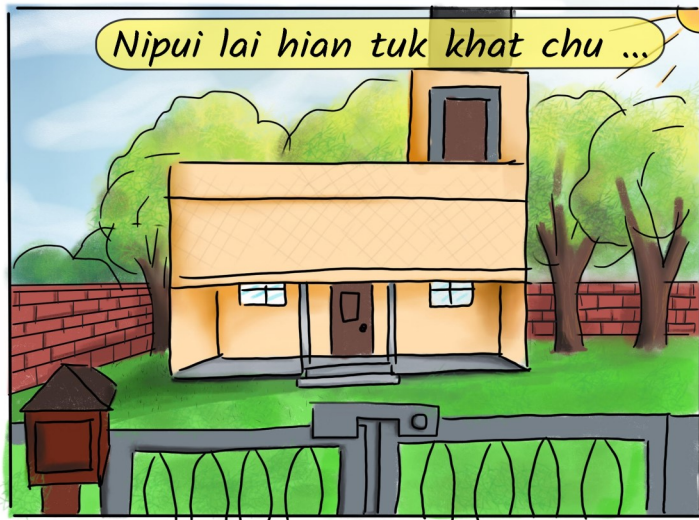
He Comic Series in a tum ber chu naupangte hnena Plasma Physics chanchin ngaihnaum leh bengvarthlak tak tak hriattir a ni.

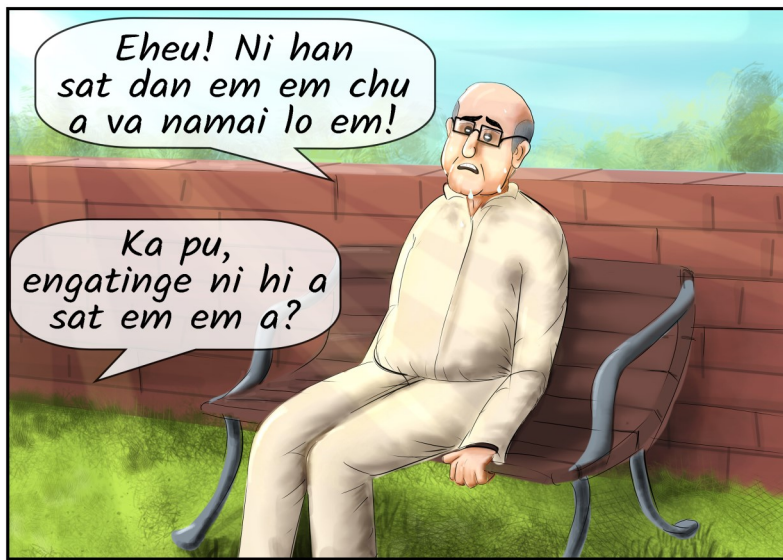
He comic series chhunga thu awnte buatsaihtu hi Ravi Kumar-a a ni a, lem ziah leh cheimawi (artwork) lam buaipuitu erawh chu Ansh Trivedi, Eklavya School, Ahmedabad hmuna pawl 12 Zirlai a ni thung.

Comic series hi tih chhuah zela, Plasma chungchang leh a tangkaina hrang hrang te, nuclear fusion hmanga thahrui (nuclear energy) lo insiam chhuah dan te chhawp chhuah zel theih kan inbeisei a ni.

He thil hi science huang tih Zauna tura hmalakna pakhat niin India ram in kum 75 a tlin lawmna leh hriat rengna puala buatsaih a ni bawk.







Eheu! Ni han sat dan em em chu a va namai lo em!

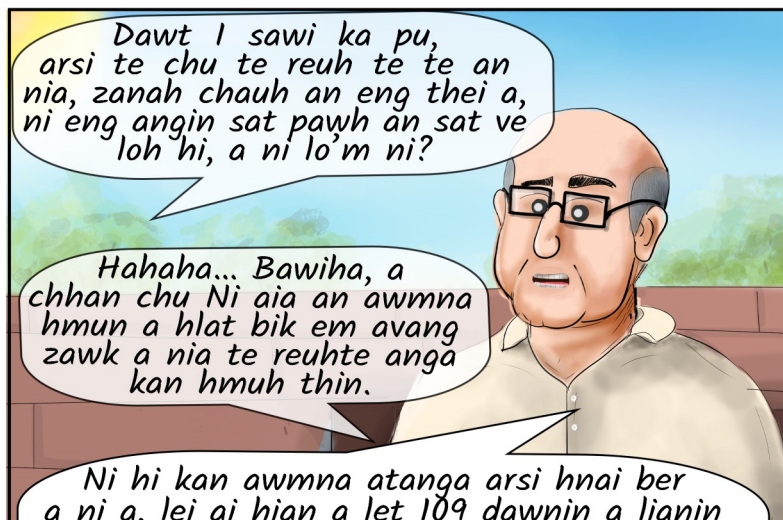
Ka pu, engatinge ni hi a sat em em a?



Bawiha... meialh hlawm lianpui a ni alawm.

A nih leh tuin nge vanah khian dah a?

Haha.. Bawiha, tu mahin an dah hran lo, arsi pakhat ve tho a ni a, kum vaibelchhe tam tak a lo eng tawh zawk maw le.



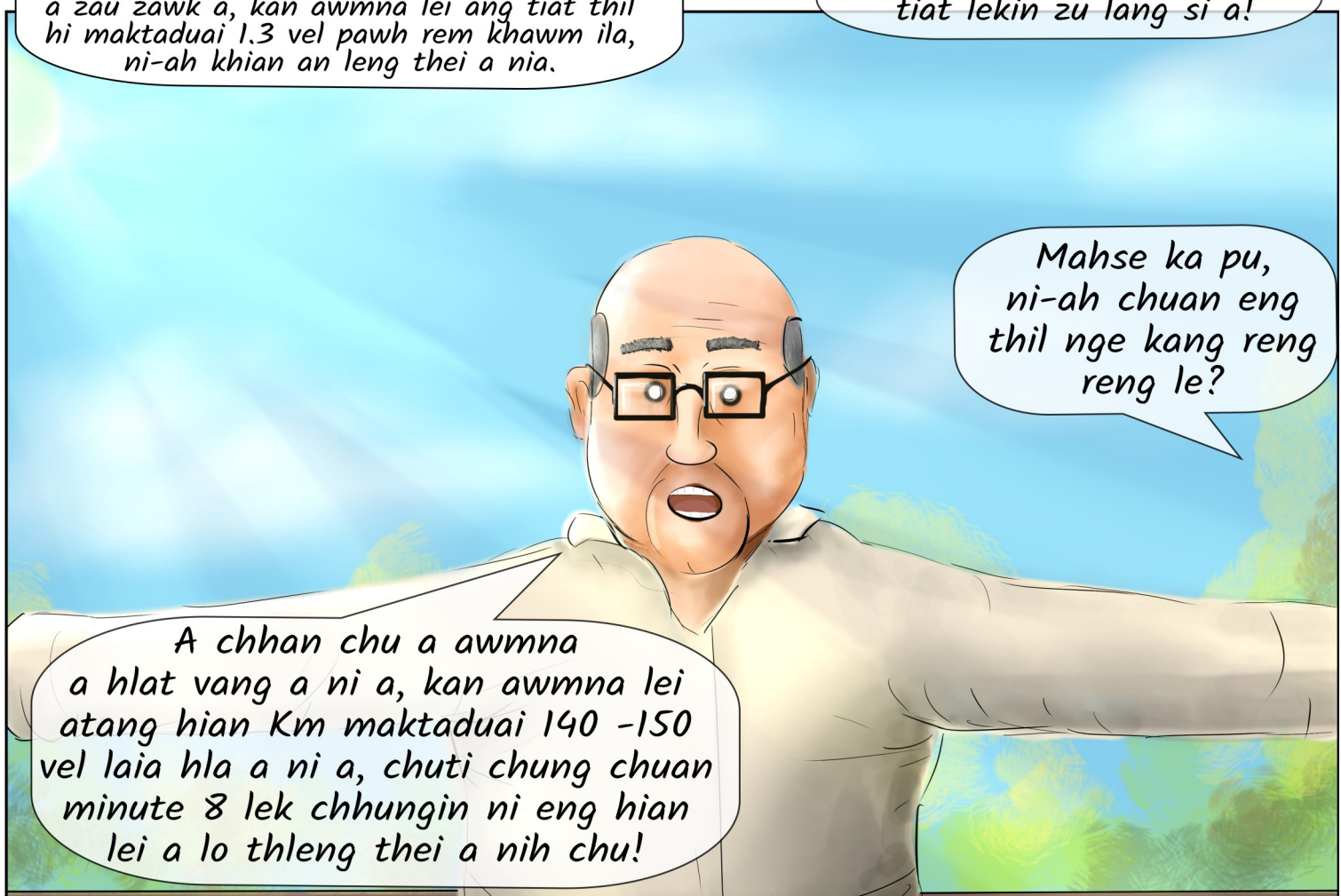
Dawt I sawi ka pu, arsi te chu te reuh te te an nia, zanah chauh an eng thei a, ni eng angin sat pawh an sat ve loh hi, a ni lo'm ni?

Hahaha... Bawiha, a chhan chu Ni aia an awmna hmun a hlat bik em avang zawk a nia te reuhthe anga kan hmuh thin.

Ni hi kan awmna atanga arsi hnai ber a ni a, lei ai hian a let 109 dawnin a lianin a zau zawk a, kan awmna lei ang tiat thil hi maktaduai 1.3 vel pawh rem khawm ila, ni-ah khian an leng thei a nia.



Eheee! A va han lian em em ve le! Mahse football tiat lekin zu lang si a!

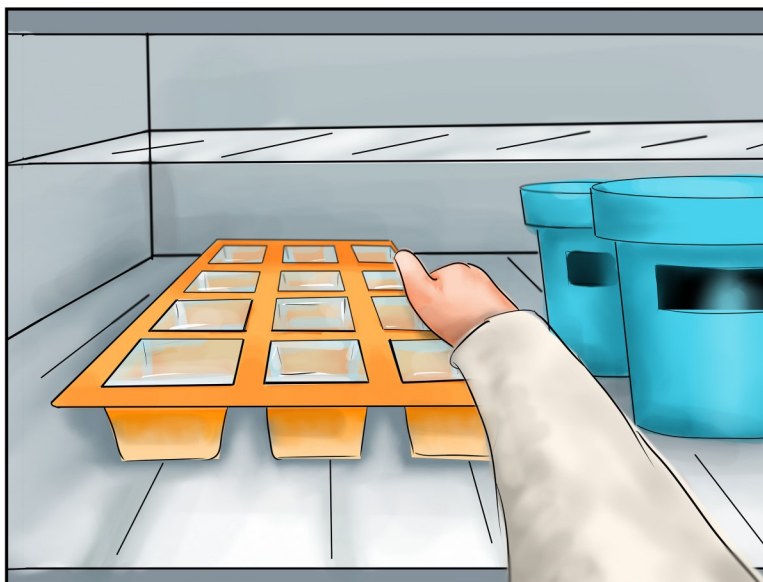


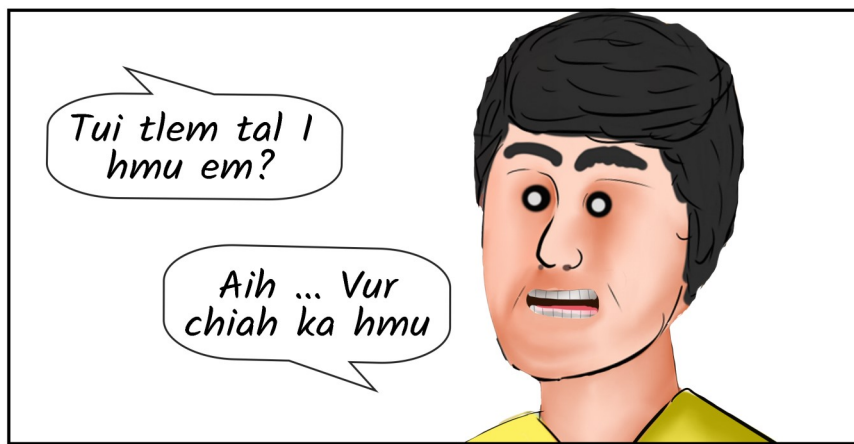
Mahse ka pu, ni-ah chuan eng thil nge kang reng reng le?

A chhan chu a awmna a hlat vang a ni a, kan awmna lei atang hian Km maktaduai 140 -150 vel laia hla a ni a, chuti chung chuan minute 8 lek chhungin ni eng hian lei a lo thleng thei a nih chu!



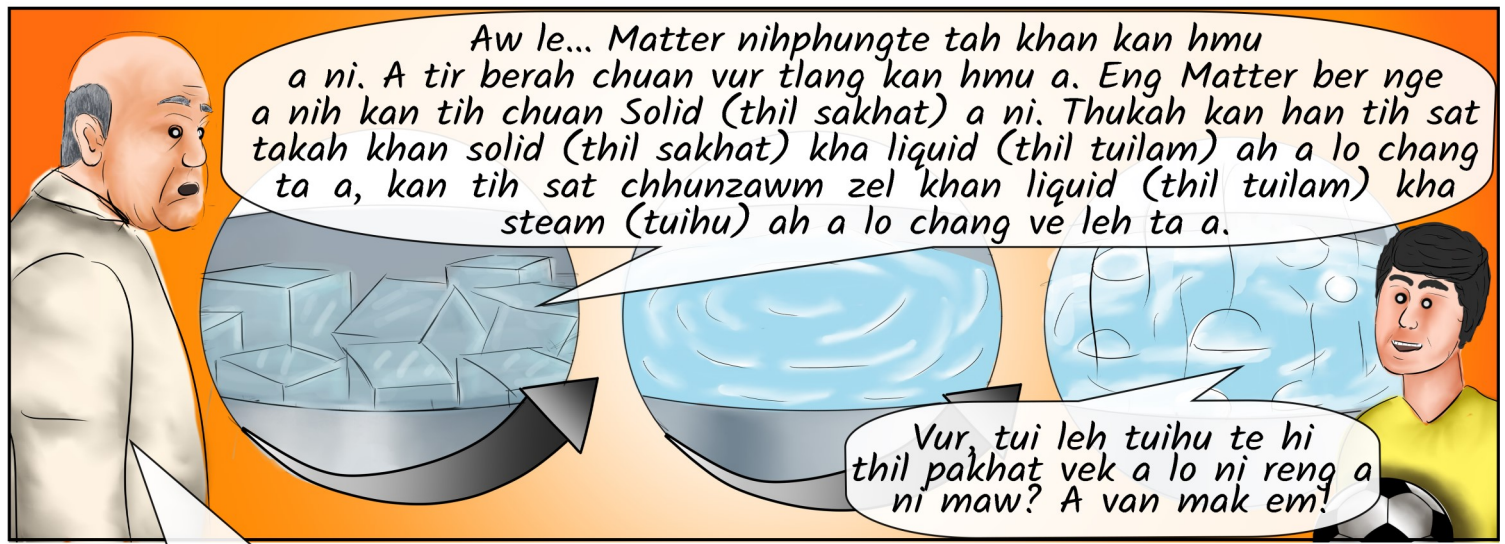
In chhungah chuan an lut ta a.



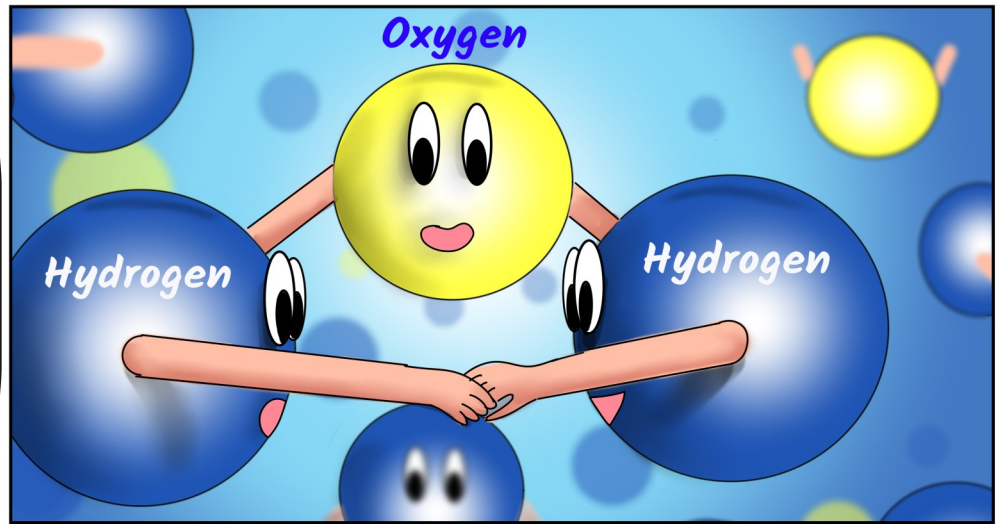


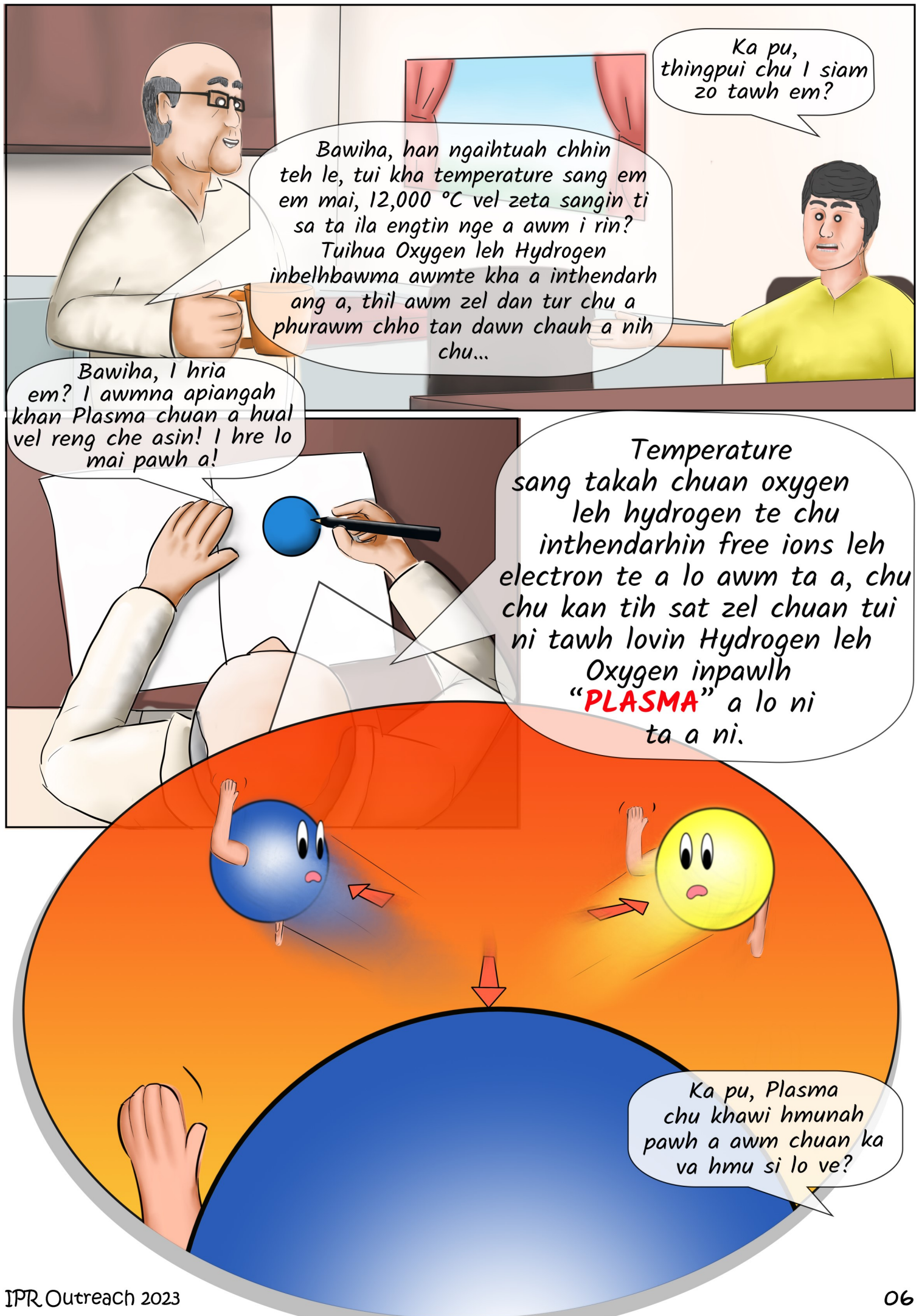
Minute reilote hnuah chuan





Ni e, thil inang vek tia sawitheih an ni a, Oxygen pakhat leh Hydrogen pahnihte inbelhbawmin a siam vek an ni a, mahse an awm dan (vur, tui leh tuihu) erawh kha chu a inang lo a nih kha.





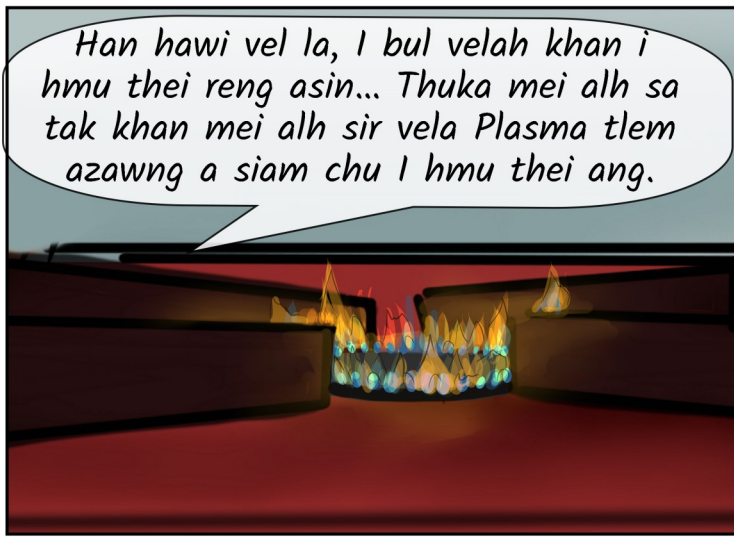
Ka pu, thingpui chu I siam zo tawh em?

Bawiha, han ngaihtuah chhin teh le, tui kha temperature sang em em mai, 12,000 °C vel zeta sangin ti sa ta ila engtin nge a awm i rin?
Tuihua Oxygen leh Hydrogen inbelhbawma awmte kha a inthendarh ang a, thil awm zel dan tur chu a phurawm chho tan dawn chauh a nih chu...

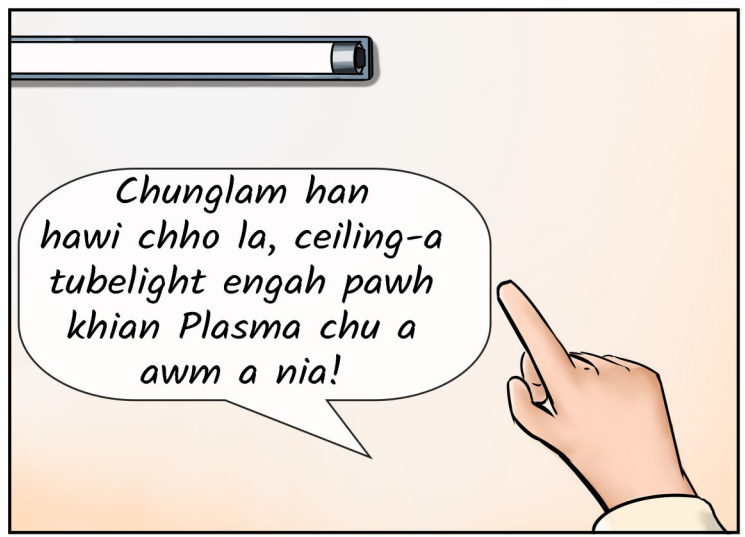
Bawiha, I hria em? I awmna apiangah khan Plasma chuan a hual vel reng che asin! I hre lo mai pawh a!

Temperature sang takah chuan oxygen leh hydrogen te chu inthendarhin free ions leh electron te a lo awm ta a, chu chu kan tih sat zel chuan tui ni tawh lovin Hydrogen leh Oxygen inpawlh **"PLASMA"** a lo ni ta a ni.

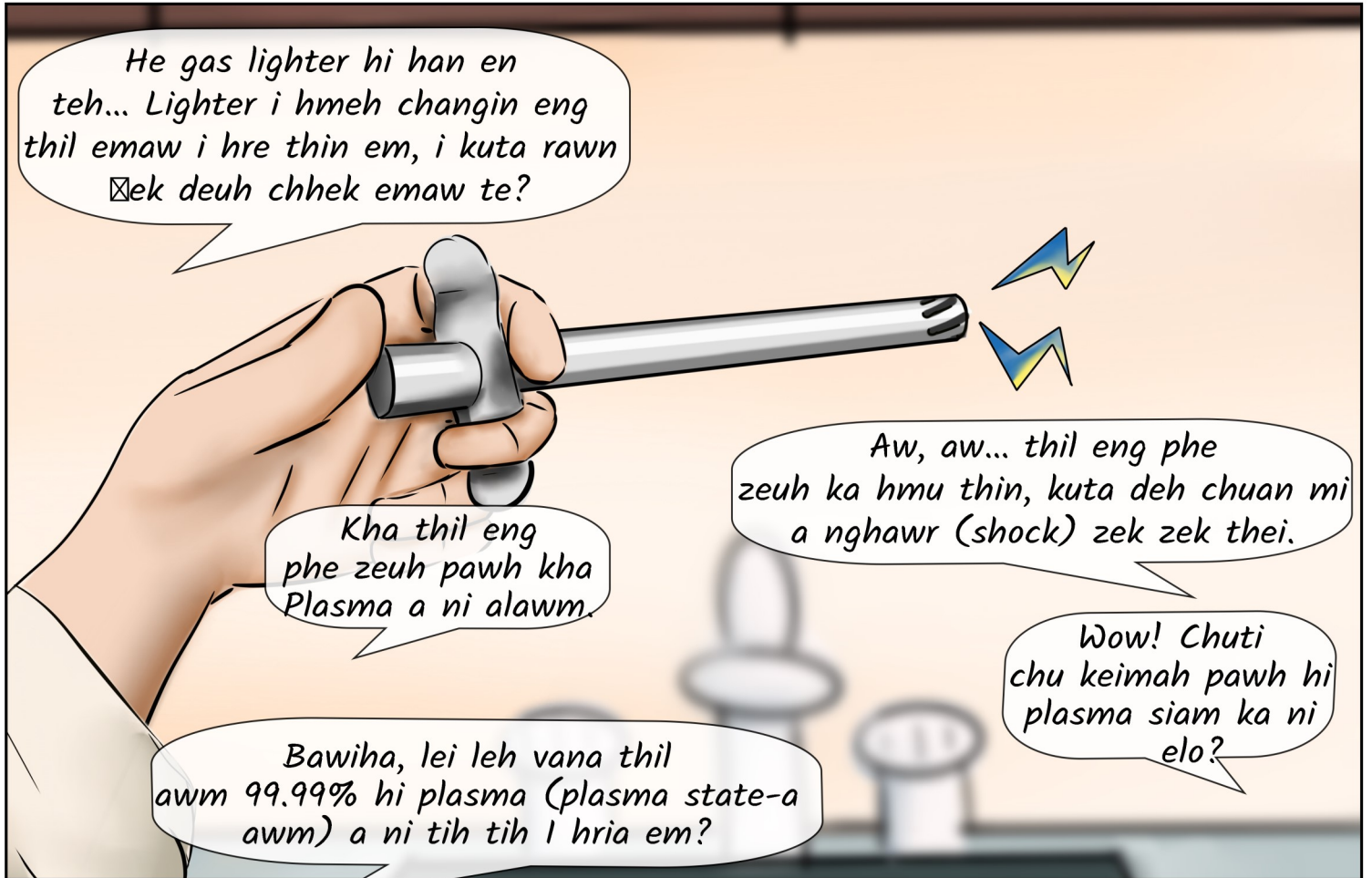
Ka pu, Plasma chu khawi hmunah pawh a awm chuan ka va hmu si lo ve?



Han hawi vel la, I bul velah khan i hmu thei reng asin... Thuka mei alh sa tak khan mei alh sir vela Plasma tlem azawng a siam chu I hmu thei ang.



Chunglam han hawi chho la, ceiling-a tubelight engah pawh khian Plasma chu a awm a nia!



He gas lighter hi han en teh... Lighter i hmeh changin eng thil emaw i hre thin em, i kuta rawn hek deuh chhek emaw te?

Kha thil eng phe zeuh pawh kha Plasma a ni alawm.

Bawiha, lei leh vana thil awm 99.99% hi plasma (plasma state-a awm) a ni tih tih I hria em?

Aw, aw... thil eng phe zeuh ka hmu thin, kuta deh chuan mi a nghawr (shock) zek zek thei.

Wow! Chuti chu keimah pawh hi plasma siam ka ni elo?



Hahahah! Nangmah tak kha chu plasma i ni tihna a ni lo. Mahse van boruak zau tak, vanthengrenga arsi zawng zawng leh arsi inhlawm khawm (galaxy) te khi plasma an ni mawle.

Hetiawng zawng hian sawi ila a fuh awm e. Kan taksa bung tinrengte hi plasma, kum tam tak, kum tluklehdingawn liam tawha arsi thitane atanga lo insiam tihna ang a nih chu!

Wow! Plasma chu Pathian ang maiin hmun tinah a awm zu ni reng a!

A van mak em! Arsite nen inzawmna kan lo nei reng mai a.

A nih chuan ka pu, vur
tlang te, tui te leh tuihu te ang tho
khan plasma hi Chiang takin kan hmu
thei em?

A hmuh theih alawm;
amaherawhchu vur te, tui leh tuihu te
lan dan ang ni lovin. Plasma chuan
ions leh electrons te a nei tih kha ka
hrilh tawh che em kha?

Plasma
chhungah chuan chung
ions leh electrons
tluklehdingawn tam takte
chu, khuai rau thlawk
mur mur ang mai hian an
phu mur mur a.

Tin, Plasma
thenkhat chu sa
tak te, sa vak lo te
pawh an ni thei a
ni, a insiam chhuah
dan a zirin!

Chutianga an chet velna
lamah chuan ions thenkhatte chu
electrons te nen insu velin an inbelhbawm
that leh chuan a tira atom kha a lo insiam
leh thin a. Chutih rual chuan energy
(thahrui) lo insiamin, eng (light) angin a lo
lang thin a, chu chu kan lo hmu thei ta
thin a ni.

Mahse ka pu,
chung chu engtin nge ni
(sun) nen a inkaihhnawih
dan le?

Aw.. a ni maw! ka lo
theihngihlh hman a ni maw!



Ni (sun) lai tak khi, temperature sang em
em mai a ni a, chuta hydrogen awmte chu
plasmaah an chang ta thin a ni.

Chu plasma, ni lai tak ami
chu a sain a muk em em mai a, chuta
Hydrogen inhlawm khawm chuan Helium
siamin energy (thahrui) nasa tak chu
'eng' angin a pe chhuak ta thin a ni.



Thahrui

Hetianga ni atanga
energy lo insiam chhuah dan
ropui tak mai hi "**Nuclear
Fusion**" an ti a ni.

Kan hriat loh laite hian
ni-ah khian energy insiam
chhuak turin thil nasa tak a
thleng reng tihna a nih chu!



Chuan maw Bawiha, he plasma hi alawm, ni (sun) atanga chakna thahui (energy) lo insiam chhuah theihna, he kan awmna solar system chhunga chakna thahui (energy) kan mamawh zawng zawngte lo awm theihna bul chu.

Heng energy zozai, second khat chhunga 384.60 septillion watts zet pe chhuak tur hian kan Ni khian second tinin Hydrogen Kilogram tluklehdingawn zaruk (600 billion Kg) zet a kang ral thin a nih chu mawle!

Chumi awmzia chu 384,600,000,000,000,000,000,000,000 watt tihna a nih chu. A va han tam em!

Eheee... A va han tam rem rem ve leh! Number 100 thleng bak ka hre hleinem!

Nooo.. I will take bath only in water!

Khai le! Bawiha, inbual a hun e... vawiinah chuan "**Dihydrogen Monoxide**" hmangin I inbual dawn nia... Hahaha

**A TAWP
TA**

*H₂O (Tui) = Dihydrogen Monoxide (Tui Chemical hming a ni e)

PLASMA CHUNGCHANGA THU NGAIHNAWM LEH BENGVARTHLAK TAK TAKTE

Universe (lei leh van) hmun zaa sawmkua pakua leh point pakua 99.999 % te hi plasma (plasma state-a awm) an ni.

Plasma hi kan bul vel hmun tinah hian a awm a ni: Kawlpheah te, aurora, fluorescent tubes, meialh leh electric sparks leh thil dangah te.

Plasma hi temperature hniam tak (absolute zero) tanga 5 trillion-degree Celsius aia sangahte pawh a awm thei a ni.

Plasma ion-engines hmangin ni 40 lek chhungin spacecraft-in Mars a thlang thei a ni.

Simeikhu leh vut paw ang tak hual veltu (ring) nei chiho planet te hian dusty plasma an nei.

Second tin hian plasma vawt, kg l bawr vel hi kan awmna lei tuamtu atmosphere atangte hian a put chhuak reng a ni.

Plasma hi electric leh magnetic field ten an tawh theih avangin heng hman hian a thunun theih a ni.

Leia magnetic field-te hian ni zung atanga charge particles hlauhawm tak tak lokal thinte lak atangin min veng reng a ni.

Plasma hian agriculture te, engineering, electronics, medicines, textiles, waste treatment leh aerospace-ah te tangkaina a nei nual a ni.

Copper ai pawhin plasmaah hian electric a kal chak thei zawk a ni.

Plasma vawt (cold plasma) hi bacteria tha lo chi tihluntu tha ber leh mihring vun tana hlauhawm si loh a ni.

Kawl vawikhat phe zeuh ringawt hian bulb watt 60 hi thla ruk chhung vel tieng thei tur khawp chakna a nei.

Plasma hi energy siam chhuahna khawl, nuclear fusion machines-ah temperature tih sanna atan hman thin a ni a, ni chhungril satna ai pawha a let 15 a sangin a tih san theih a ni.

Plasma Physicist Lar Te



Anatoly Vlasov
 Andrei Sakharov
 Bimla Buti
 Francis Chen
 Hannes Alfvén
 Igor Tamm
 Irving Langmuir
 John Lawson
 Kunioki Mima

Lev Artsimovich
 Lev Landau
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 Meghnad Saha
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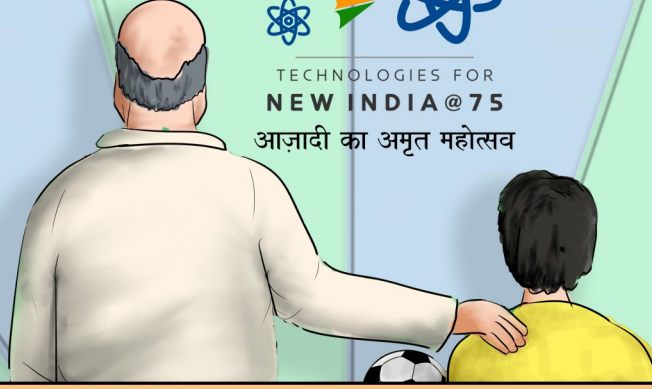
"PLASMA KHAWVEL MAK TAK MAI CHU" COMIC SERIES NO. 1

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TECHNOLOGIES FOR
NEW INDIA @ 75

आज़ादी का अमृत महोत्सव



Institute of Plasma Research (IPR) hi Research & Development Institute niin Sabarmati lui kam, Indira bridge, Gandhinagar, Gujarat a awm a ni a. Kum 1986 Khan din niin Department of Atomic Energy hnuaiah a awm a ni. Institute of Plasma Research hian Plasma Science thiamna chungchang leh a hman-nate Zir chiana, Energy sim chhuahna khawl, Nuclear Fusion technology siam chhuah leh tih hmasawn te an tum ber a ni. He Institute hian Plasma physics Zir chianna, experiment te, Tokamak experiment, theoretical leh computational studies te chak takin a kalpui mek a ni. (Tokamak hi nuclear fusion reaction hmanga energy siam chhuahna khawl a ni). IPR hnuaiah Tokamak experiment pahni kalpui mek niin pakhat chu "Aditya" a ni a, Aditya hi Tokamak, India kutchhuak hmasaber niin kum 1990 atang Khan hman tan a ni tawh a, pakaht dang leh chu Steady-State Superconducting Tokamak (SST-1) a ni. IPR hi khawvel pum huapa energy siam chhuahna nuclear fusion mega-project, France rama hmalakna kal chho mekah pawh nodal agency a ni bawk. Chutiang chuan, IPR hian energy siam chhuak thei fusion technology tih hmasawwna programme lian tak a kalpui mek a. Chu bakah chuan thil siam chhuahna hmun Industry-ah te leh mipui hman tangkai theih tur plasma technology tih hmasawwna kawngah te a thawk nasa hle a ni. IPR hi LIGO-India gravitational wave project (lei leh Van boruaka gravitational wave Zir chianna) ah pawh a tel ve a ni.

Institute of Plasma Research ten
India ram kum 75 tlin hriat rengna puala he
thil hi an buatsaih a ni.



A Thuphng, Thawnthu Leh Script
Ravi A. V. Kumar

Artwork & Layout : Ansh G Trivedi
ansh.g.trivedi.2004@gmail.com



Outreach Division
Institute for Plasma Research,
Gandhinagar 382428 (Gujarat)



E-mail : outreach@ipr.res.in
Web : www.ipr.res.in/outreach
Contact : 78018 34469 (Whatsapp)