Hawaan Kiisii Koo Keessa

Giraazshinaa Sitaasiinikaa

Qorannoo Hawaa Paaris

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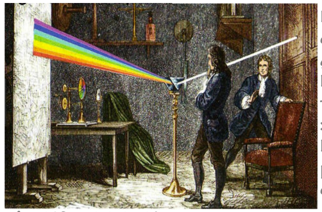
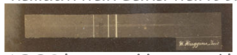


Niwuten qawwa golgeewwan keessatti tolchee, xiyyoota-biiftuu gara pirizimitti qajeelche.

Inni Ifa pirizimi keessa qaxxamuree sana waraqaa adii diriiraa irratti wal'ittiqabe, halluuwwan bareedaa sabbata-Waaqayyoo agarsiise. Pirizimi lammaffaa fuldura diriiraa sana ka'uudhaan, fi kofa isaa sooksaa halluuwwan sana wal'itti makee ifa adii



Tortiba balballa'aa isa jalqaba, bara 1860 keessa Hageenzi kan hojjete.

Tortiba 'balballa'aa' garbiroo kan Ediwiin Habiliin nannoo 1920tti fuudhatame. Innis sararoota callabboo dugduubbee-ifaa irradabalame agarsiisa, kunis tortiba urjiilee kan fakkaatu. Kana jechuun 'balballa'aan' kun gaasii irraa osoo hin ta'in urjiilee irraa akka uumame dha. Waantotni akkasii kun amma 'gaalaaksotaa' jedhamu.

Jalqabbi Ispeektirooskoopii

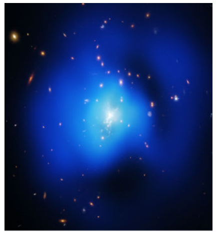
Bara 1665, Ayzak Newuten, namumti bodarra seera giraavitii argate, ifti Biiftuu maka halluuwwan adda addaa akaa ta'e agarsiisera.

Garuu, qorattoota astiroonoomii carraa dhugaa kana fayyadamanii ifa waantota astiroonoomii irraa finfinan quwachuuf yeroo dheeraa fudhateera.

Tortiba, 'spectrum', ifa pirizimiidhaan calalameef Niwuten maqaa moggaase, odeeffannoo hedduu waa'ee walmakasa, ho'asa fi rukkina madda finfineessaa qaba.

Tortibee waantota garhawaa isa jalqabaa fudhachuudhaaf, argannoo Niwuten booda waggoota 200 ol fudhateera.

Gaalaaksiin Sombireeroo hangaan guddaa kan ta'e abbaa wirtuun baayyee dorca'af irra caalaan urjiilee dulloomaa, fi beeddee haphii urjiilee, gaasi, fi dhukkee irra uumame dha. Bitaa: Fakkiin teleskooppii ESO 1.5 m ifa mul'ataan kan fudhatame. Mirga: maka halluu sobaa: fakkii infirareedi (diimaan) isa Teleeskooppi-Ispeesi Ispitizeriin fudhatamee, kan fakkii Teleeskooppi-Ispeesi Haabiliin (ifa mul'ataan: bifa samii) fudhatameen walmake.



Gurma gaalaksota Fiiniiksi. Fakkiilee gaalaksotaa (keelloon) fakkii X-reey bifa samiin (Chaandiraa X-reey teleskooppiitiin) walmake, gaasii dumessa guddaaf ho'a kitila tokkoon ol-irratti argamu kan ifatti baase.

Fakkiileen ifa golgamaan

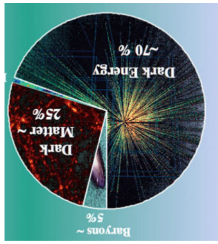
Waantota garhawa 'ifa golgamaa', kan akka reediyoweevi, maykirooweevi, infirareedi, oltiravayoleti, X-reeyi ykn gaamareeyin ilaaluun, ogeeyyota astiroonoomii haala gaariin wantootni kun maal irraa akka uumaman hubachiisa.

Fakkeenyaaf, ruqoleewwan dhukkee horbiiftu-gidduu urjiileetiin hanga ho'isa qaama namaa gadiitti ho'ifamu. Waantotni qorraan akkasii baayyinaan infirareedi finfinsu, urjiileen immoo, ho'insa digrii 3,000 hanga 50,000 qaban, ifa mul'ata finfinsu.

Gama biroon, gaasii booruu muraasni horbiiftuulee-gidduu fi gaalaksota-gidduu jiran hanga ho'isa digrii kitiloota ykn olitti ho'ifamu. Innis X-reeyotaan hundaa ol ibsa.

LRG 3-757 suurfakkaatti giraavitii. Geengoon bifa-samii kan gaalaksii bifa-samii fakkiin uggurame, battalumaan dugda duuba gaalaksii diimaa guddaa buufatee jiruuti. Gaalaksiin guddaa fi waanki callabboon keessatti argamu akka leensii giraavitii kan ifa gaalaksii dugduba jiruuti. Golbi xiyyoota ifaa giraavitiidhaan akka ta'uu danda'u Anistaayin bara 1915tti raageera.

Akka tilmaama ammaatti Hawaan, harki 70 (70%) anniisa callabboo, waanka callabboo 25%, fi Hawaa beekamaa (gaalaksota qabiyyee isaanii waliin hundaa fi walsimsiisa gaalaksilee-giddu) 5% qofa dha.



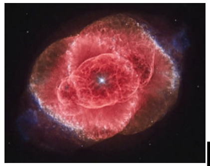
Waanka callabboo fi anniisa callabboo

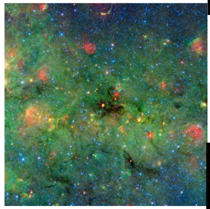
Amalootni Hawaa hubatamaan muraasni, waanka hamman baayyeen hanga ammaatti hin-hubatamne, 'waanka callabboo' jedhamu, waantota mul'atan irratti giraavitawa kan ta'e akka jiru yaadchisa. Astronoomeroonni waanki callabboon kun urjiilee xixxiqqoo ykn pilaanetoota, garii duummeyyii callabboo, garii boolla gurracha, garii faallaa-waanka akka hin taane irratti waliigalu.

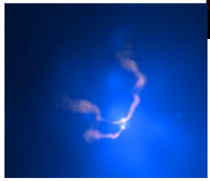
Xinxalleen gaalaksota fagoo ilaaluu akka mul'isanitti dhisamni Hawaa kun guulaa jira. Waaltinni ibsa kanaa anniisin hin beekamne, 'anniisa callabboo' jedhamutu guulaa jira.

Tiyoorotni biroon waaltinsa bakka-bu'uu danda'u jedhaman muraasni waanka callabboo ykn anniisa callabboo kan hin barbaachifne himu, garuu xinxallee ilaaluu hunda akkuma waaltinsa ibsuu qabu.

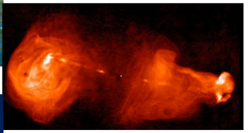
Battalle



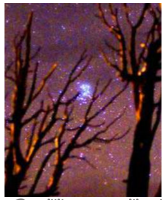




Fakkiilee kanneen keessa isa kamtu ifa mul'ataan fudhatameera?



Deebiin fuula-qopheerra jira



Suura gurmuu urjiilee Buusan (pleiades), kan ija duwwaan argamu dandaʼan, Waalii Paacholkaan kaase. Busaan (Pleiades) kun, Sabduroo kaaba Awustiraaliyaa keessatti argamaniif, garee kaangaarootaa tuuta Saroota Sologeetin (dingoes) ariʼatamani dha.

Gaaliliiyoo gaalileyi akkataa fayyadama teleskooppiisaa, nama Doozhi jedhamu kan kutaa Venesiif yommu ibsu (Fakkiin ykn Fireeskoon: Juseeppee Bertiinii).

Boca Buusan kan Gaaliliiyoon teleskooppii isaatiin ilaalee kaase. Corroggeen (Asteriks) xixxiqqoon urjilee teleskooppii malee hinmulʼanne bakka buʼu.

Suura Balbalaʼaa Arbii Gaadduu isa jalqabaa bara 1880tti Henrii Diriperiin biliqa daqiiqaa 50n teleeskooppi garkuta-geengoo 28cm taʼeen kan fudhatame.

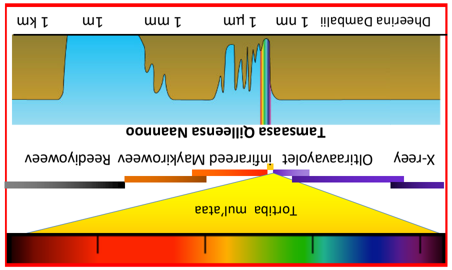
Barraaqa Astiroonomii

Bara durii, beekumsi Hawaa waanta ija namaa duwwan ilaalamu qofaa irratti kan murtaaʼe ture. Seenafoola fi raagfaajjiin ilaalcha hawaa kana guutu turan.

Jalqaba jaarraa 17ffaa irratti, teleeskooppotni warri duraa oggeeyyoota astiroonoomii waantota ija duwwaan mulʼachuu dandaʼan irra hedduu dadhabaa-gadi kan taʼan akka hubataman godhaniiru. Urjiilee dhibbaatamni haaraan fi balballaʼotni hedduun argatamniiru.

Xumura jaarraa 19ffaatti, suurfakkiin astiroonoomii qorannoon samii akka gadi-fageenyaan finiinu tasiseera. Namtokko waantokko teleskooppiidhaan hordofee ifa isaa saʼa hedduuf waraabee gabatee suuraa irratti galmeessuu qaba. Haala kanaan, namtokko qolaa-baasee pilaanetoota fi waantota balballaʼaa baayyee hubachuu qaba.

Tortiba ifaa hunda



Dheerinnii dambalii ifaa X-reeyiif 1/1000000000m gadi hanga reediyoweeviif 1 km olitti deema. Tortiba mulʼataan 0.4 hanga 0.8 µm deema, kun qooda tortiba hunda isa baayyee xiqqaa dha.

Faakkiiwwan astiroonoomii yeroo hedduu halluuwwan sobaan agarsiifamu, kunis gareen tortiba golgamaa karaa halluuwwan mulʼatani qindaʼa haaraan waan uumamuufi.

Atmoosfiiriin lafaa ifa Biiftu isa mulʼataa, reediyoweevi fi infirareedi muraasa ni dabarsa. Infirareedi-fagoo ykn oltiravayoleti ykn X-reeyi waantota garhawa ilaaluudhaaf oggeyyiin astiroonoomii satelaayiti fayyadamuun dirqama.

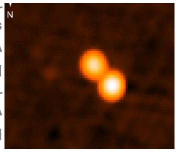
Ifa Golgamaa (Invisible Light)

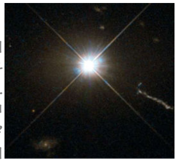
Ifti mulʼatu, ifa iji namaa ilaaluu dandaʼu, tortiba qanqaʼa waliigalaa keessaa qooda baayyee xiqqaa qofa bakka buʼa.

Ifti dheerina-dambali isaatiin ibsamuu dandaʼa. Dambalii-dheeraa irra hanga gabaabaatti makti ifaa

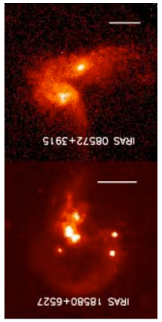
- reediyoweev (kan akka reediyoo fi televiishinii keenyaan simatamān),
- Maykiroowev (kan akka gemmoo Maykiroweevi hoʼisa nyaataaf fayyaduu),
- Infirareed (Waantota hoʼaan finfinsaman, fuulleewwan ilaaltuu addaan kan mulʼatan),
- Mulʼataa (Ifa-Biiftuu, ampuulii),
- Oltiravayolet (Ifa-Biiftuu golgamaa gubaa-aduu fi waxala-goga geessisu dandaʼu),
- X-reey (lafee qaama ilaaluu fayyada).

Hoʼi qamtokkoo inni ol-aanaan, ifa dambalii-gabaabaa isa gaditiin finfinsamee ti.





Fakkii reediyoo burqaan isaa waanta 3C273 taʼe, teleskooppi VLAn fudhatame. Bara 1963, Maartin Shimit waanti kun gidduun isaa bifa samii, urjii-fakkaataaf baayyee fagoo taʼu agarsiisera. Kunis kuwezaari (quasar) isa jalqaba argatame ture. Fakkii ifa mulʼataan (Haabil Ispees Teleskooppiin) kan fudhatame furuura gaasi saffisa olaʼanaan kuwezaari irraa bahan mulʼisa.

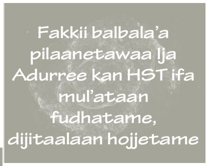


Fakkii gaalaksota lamaa, kan satelaayiti IRASn (infirareedin) argame, Haabil Ispees Teleskooppiin ifa mulʼataan fudhatame. Isaan infirareedin dachaa 100 caalaa ifa mulʼataan ilaalaman irra ibsu, kanaafu ULIRs (ultra luminous infrared galaxies: gaalaksota ibsa hoʼa ol-guddaa) jedhamu. ULIRs hedduun gaalaksota jalee dhihoo waanqabaniif mallattowwan walʼirbaa agarsiisu.

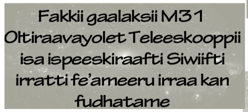
Argannoowwan ifa golgamaan

Waantotni Hawaa keessa jiran hammi tokko hanga ogeeyyoni astiroonoomii teleskooppota ʻifa golgamaaʼtti miirawaa taʼanin ilaalanitti guutumatti dhokatanii turan. Wantootni garmalee qorran ykn hoʼan irra caalaa garee tortiba golgamaa kan finfinan fi ifa golgamaa isaaniin kan argatamaniiru dha. Yeroo booda qofa, astroonoomotni bakkuma tokko teleskooppota guddaa kan ifa mulʼataa, ifa hedduu walittiqabu fi baayyee mirawaa kan taʼan, xumurarratti waantota kana ifa mulʼataan ilaalu dandaʼaniiru.

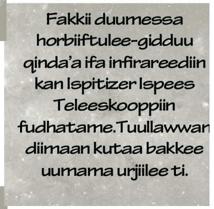
Kunis dhimma kuwezaarota ture, fknf, reediyoo tiin kan argataman, akkasumas gaalaksota gaamareeyi dhoosan ofkeessatti qabatan, argannoon gaamareeyota kanas gaalaksota isaan irra maddan kan dursu ture.



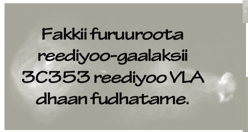
Fakkii balbalaʼa pilaanetawaa Ija Adurree kan HST ifa mulʼataan fudhatame, dijitaalaan hojjetame



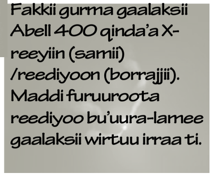
Fakkii gaalaksii M31 Oltiraavayolet Teleeskooppii isa ispeeskiraafti Siwiifti irratti feʼameeru irraa kan fudhatame



Fakkii duumessa horbiiftulee-gidduu qindaʼa ifa infirareediin kan Ispitizer Ispees Teleeskooppiin fudhatame. Tuullawwan diimaan kutaa bakkee uumama urjiilee ti.



Fakkii furuuroota reediyoo-gaalaksii 3C353 reediyoo VLA dhaan fudhatame.



Fakkii gurma gaalaksii Abell 400 qindaʼa X-reeyiin (samii) /reediyoon (borrajjii). Maddi furuuroota reediyoo buʼuura-lamee gaalaksii wirtuu irraa ti.

Hawaan Kiisii Koo Keessa Lakk. 2

Kitaabni bexxelleen kun bara 2017 Giraazshinaa Sitaasiinikaa bakka Buufata Qorannoo Hawaa Paaris (Faransaay) irraa kan barreeffame fi keeddeebiin Istaan Kuritzi kan Inisititutii Reediyoo Astiroonoomii UNAM (Moreeliyaa, Meeksikoo) tiin hojjetame dha.

Fakkiin haguuggii: Chaandiraa Diip Fiildi Saawuz muraasa, Chaandiraa Ispees Teleeskooppiin ifa X-reeyotaan fudhatamee fakkii qindaʼe. Kuwezaarota dhibbaatama hanga fageenya bara-ifaa biliyoona 12tti jiran agarsiisa. Fakkiileen kitaaba bexxellee kan keessa jiran irra caalaan teleeskooppota Haabil, Ispitizeri fi Chaandiraa Ispees, akkasumas teleeskooppi tarreewwan reediyoo isa baayyee guddicha (Very Large Array radio telescope) kan dhufanii dha.

Waaʼee walfaannee kana fi waaʼee mataduree kitaaba-bexxellee kana keessatti dhiyaatan caalaatti baruudhaaf, http://www.tuimp.org daawwadhaa.

Hiikkaa: Toluu Biresaa, Jifaar Rayyaa

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