

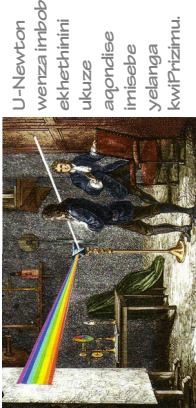
Ukuqala kweNhlolokukhanya

Ngonyaka we-1665, u-Issaac Newton, lowo wakhuphulula imithetho yomNyondo, wakhombisa ukuthi ukukhanya okuphuma elangeni kwakwenziwe imibala ehlukile.

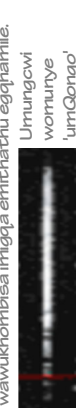
Kwathatha iminyaka ukuthi iziMfundindalo zencike kuloluwazi ukuze zifunde ukukhanya okukhafuwa izinto ezisemkhathini. Ibhudlulukhanya okuyinyama u-Newton alinikeza ukukhanya okunhlalunhlaluziswe iPrizimu, liqetheke ulwazi ngokwakhiwa, ukushisa, kanye nesiluthi saloyonto ekhafula lokho kukhanya.

Ibudlulukukhanya lokuqala-ngqa latholokala emva kweminyaka eyam-200 kwemikhuphululo ka-Newton.

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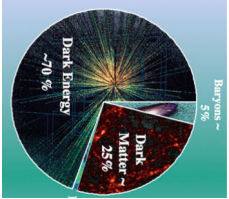
U-Newton wenza imbobo ekhethini ukuze aqondise imisebe yelanga kwiPrizimu. Waqondisa ukukhanya kwelanga kwiPrizimu okwakhiqiza imibala yoThingo lwenkosazana. Ngokubeka iPrizimu yesibili phakathi kwehidi kanye nePrizimu yokuqala, wadlala ngelngoni ukuze akhiqize umubala omhlophe welanga.



umungowi wokuqala womGongo, wenzwa u-Huggins ngo-1860, wawukhombisa imigqa emithathu egqhamile. Umungowi womunye 'umGongo' owathwetshulwa u-Edwin Hubble ngabo-1920. Ukhombisa imigq'ensundu ebekwe phezu kwengemuva eligqamile, elibukeka samungcwi weziNkanyezi. Okubhekukuthi lamafu aluthuli akuswo amafu izinkanyezi. lokhu sikubiza ngo 'Mthalakazi'

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esiwubonayo (imThalakazi) kanye kanye nokutholokala kwinqoke) kwenza u-5%.

Izibalo zikhombisa ukuthi umkhathilibe wathwe: inMpekumpeku ezithekile yenza cishe u-70% womkhathilibe, 25% inJelwane, kanti umkhathilibe 'esiwubonayo' (imThalakazi) kanye kanye nokutholokala kwinqoke) kwenza u-5%.

Uzontleko lomNyondo H-863-757.



Isangqo esilundwa isithombe esihlakanekelwe somThalakazi olundwa, ongenwa komThalakazi oyhnguzung'ebonvu.

UmThalakazi oyhnguzung'eqokethe uTho olungabonakali usebenza njengeNgilazi yokukhulisa ukukhanya okuphuma kumThalakazi ongenwa kwawo, ukukhweceka kwemisebe kukhwecewa umNyondo njengoba ayekhulile u-Einstein ngo-1915.

UTho kanye neMpekumpeku Engabonakali

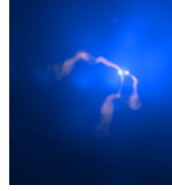
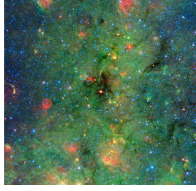
Ezinye zezimilo zomkhathilibe zikhomba ukuthi kukhona itsehe loThi olungahlonzeki, elubizwa ngokuthi 'InJelwane', obonakala kuphela ngomNyondo wawo ophazamisa ukunyakaza kwalokho esikubonayo. Osoosayesi abavumelani ukuthi lolutho akusizo iziNkanyezi, imiHlaba emincane, amafu ansundu, iziGwinq, noma ungoTho. Ubuko lemiThalakazi esekudeni kukhombisa ukuthi ukulwiza komKhathilibe kuyakhawuleza. Incazelo ekuvunyelwana ngayo ukuthi kunohlobo lweMpekumpeku olungaziwa oludala lomkhawulezo, ebizwa nge 'inMpekumpeku engabonakali'.

Ananye amaTyori awadingi uTho noma impekumpeku engabonakali, kodwa kumele akwazi ukuchaza lokhu esikubonayo njengoba lawomTyori ekuvunyelwana ngawo enza.

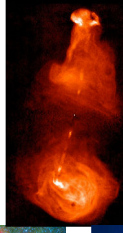
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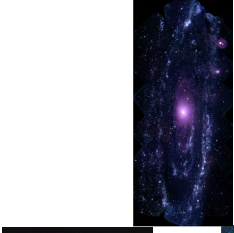
Imibuzo



Iziphi iziThombe ezithwetshulwe kwiSokhanya?



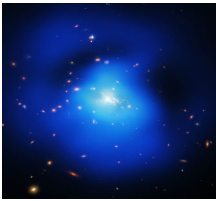
Izimpendulo zikwi overleaf



UMkhathilibe Ephaketheni Lami



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IsKhoke semThalakazi i-Phoenix, isithombe semThalakazi (oncombo) sibekwe phezu kweSokhanya esathathwa izipopolo i-Chandra, esiveza iku elikhulu elinamazinga okushisa afinyelela kwizinkulungwane.

UmThalakazi i-Sombrero oyhnguzung'eqokethe umseka oyhnguzung'owakhiwe izinkanyezi ezindala, kanye nothungathunga. Isinxelel isithombe esithwetshulwe izipopolo ze-ESO 1.5 m ububanzi kwiSokhanya, esokudla: isithombe sombala ongewona: isithombe esithathwe izipopolo i-septizer kwiSobonvu (ebonvu), oshishilwe kwiSithombe esithathwe izipopolo i-Hubble kwiSokhanya (oluhlaza).



Izithombe kuMungcw' Ongabonakali

Ubukomkhathi kumungcw' ongabonakali ofana neMazana, iNsimagu, iNisibonvu uZukwiti, iXamagu, noma iMisebentaThu, ivumela oSosayensi ukuthi bazi kabanzi ngendalo yezinto ezisemkhathini.

Isampula, uHoyana lothungathunga lufudumezwa iziNkanyezi lufinyelele emazingeni angaphansi kwawomzimba womuntu. Izinto ezicabazeke kangaka zikhafula kwiNisibonvu, kanti iziNkanyezi ezinamazinga okushisa aphakathi kwa-3 000 kuya kuma-50 000 zikhafula kwiNisokhanya. Kolunye uhlangothi, uthungathunga oluthibeliwe lufudumezwa iifike emazingeni okushisa ayizinkulungwane noma ngaphazulu. Luguhamna kakhulu kwiXamagu.

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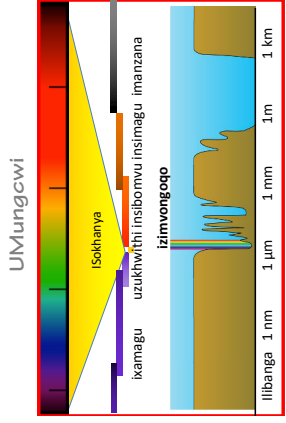
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Ngalendlela babekwazi ukuhlonga iminingilizo yemiHlaba kanye nemiQongo. 3



Ilibang ba lokukhanya leluakela ngaphansi kwa-
 1/1,000,000,000 m kwixanagu kuya
 ngaphezulu kwa-1 km kwilMarzana. UMungcwgi
 obonakalayo useukela ku 0.4- uya ku 0.8Jum,
 okuyingxenyene ecane yeMungcwgi ophelele.
 Izithombe zaseemKhatini zifakelwa imibala
 yokunanezela, okuye kukhombise ingxenyene
 yeMungcwgi onganobakali kulezoziThombe.
 UMoya uvongogqile kwizingxenyene ezithile
 zeMungcwgi, ukuze izimfunindalo zibone
 uMungcwgi onganobakali, okhafuwa izinto
 ezisemKhatini zisebenzisa iziThopolo zomkhatini
 noma lezo ezizingaba umThaba.

Ekusanguluki Kwezomkhathi

Ukukhulusha Nhlanya Mbambo
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Astronomy institute in Morelia (Mexico).
Ikhave: Ingxenywe yeningizimn yewalakhahla le-
Chandra, isithombe eswumanglanganisa
esthativhe kwixhamagu ngezifpopo
zomkhathi i-Chandra, ikhombisa amakhulu
ezifPopo asekuqeni okungango-1.2 billion
light-years.
Izithombe ezininzi kuleNcwajana zithativhe
kuzifPopo i-Hubble i-Spitzer, kanye
neChandra, kanye nakwizifpopo zemanzana i
VLA (Very Large Array radio).

UMkhathilibe Ephaketheni Lamri No. 2

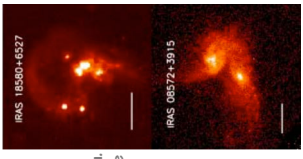
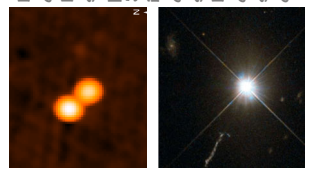
UMkhathilibe Ephaketheni Lami No. 2

Imikhushulo kwingcwi engabonakali

Ezinye izinto kumKhatlilibe zifihlekile, kuze kuba oSosayensi bazibuke ngezizopololo ezizaze 'kwingcwi efihlekile'. Izinto ezibandakanya noma ezishisa-bhe zikhatfula kwiNgcwi efihlekile kanti zakhuish -ulwa ngeNgcwi yazo engabonakali. Kamuwa, lapho oSosayensi babebuka emkhatlini ngezizopololo ezinkulu ezizoqa ukukhanya okuningi futhi ezizaze, basebekwazi ukubona lezizinto kwiNgcwi ebonakalayo.

kwakuyilesisimo nakwiziPhinji, isampula, zakhushulwa kwiManzana, kanye nemiThalakazi equkethe zikhatfula kwimisebentathu, lapho khona imisebentathu yahlongwa maphambili kokukhuphulwa komThalakazi.

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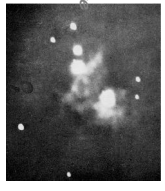
Isithombe semiThalakazi
emibili eithathwe i-Hubble
kwiSokharya eyakhushulwa
kwiSokharya eyakhushulwa
isizungezi i-IRAS kwiNobomvu
Ukuqophama kwayo kuphindeke
ngokwe-100 kwiNobomvu
kuna kwiSokharya, kamdi
zibizwa nge-ULIRGs
(Inithalakazi ensibomvu
ekhafu kanje). Eminingi
Inithalakazi inesingani
neminye inithalakazi

Ukukhanya okungabonakali

- Isokhanya, limele ingxenye encane yoMungcw.
- Ukukhanya kungachazeka kalula ngelibanga lalo. Kusukela kwelifishane kuya kwelide, ukukhanya kwenziwe
- Imanzana (lawo anqakwa uMabonakude kanye nemiSakazo, nomaKhala ekhukhwin),
- Insimagu (njengalawa esifudumeza ngawo ukudla emakhaya),
- Insimbvu (akhafulwa izinto ezifudumele, ibonakala ngezibuko ezibalulekile),
- Isokhanya (lilanga, amalambu)
- Uzikhwithi (isokhanya eliphuma elangeni elidala inusundo kanye nolovuka)
- Ixmagu (ukubona amathambo).

Into enamazinga aphezulu okushisa, ikhafu uMungcw onelibanga elifishane.

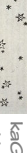
2



la iThombe sokugqala ngqa
samathu aluthuthi. Oton
esathwetshulwa u-Henry
Draper ngo-1880 eyichayk-
u-50 min, esebenzisa
izipopolo ezingu-28 cm
ububanzi.



uGallie Gallie! echanza
iMantenu enkulu yase ventice
ukuthi uzele bantisa kamjani
lizi popoli (Francesco ngu
Giuseppe Bertini) Umndwebo
kaGallie okhombisa



leTl'horthe sesilShomo isilimela
esithwetsahlwe u-Wally
Padholika, esikwazi ukubonakala
ngamreha. Kwabandabuko base
Ausstralia isilimela, siyigumbu
lamakhangaru alathwa
iqopo lamadlango.