

UMkhathilibe Ephaketheni Lami

UMkhathilib'Osithekile



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IsiThombe sesiShomo isiLimela
esithwetshulwe u-Wally
Pacholka, esikwazi ukubonakala
ngamehlo. Kwabendabuko base
Australia isiLimela, siyiqembu
lamaKhangaru ajarhwa
iqoqo lamaDingo.



uGalileo Galilei echazela
iMantshu enkulu yase Venice
ukuthi uzisebenzisa kanjani
iziPopolo (Fresco ngu
Giuseppe Bertini).



Umdwebo
kaGalileo
okhombisa
isiLimela ngendlela esibonakala
ngayo kwiziPopolo. Amasterikhi
amancane amele iziNkanyezi ezifiphele.

IsiThombe sokuqala ngqa
samafu aluthuli i-Orion
esathwetshulwa u-Henry
Draper ngo-1880 eyichaye
u-50 min, esebenzisa
izipopolo ezingu-28 cm
ububanzi.



Ekusangulukeni Kwezomkhathi

Emandulo, ulwazi ngoMkhathilibe lalukhawulwe ilokho okwakubonwa ngamehlo kuphela. Izinganekwane zazisetshenziswa ukuqinisa imibono thizeni ngoMkhathilibe.

Ekuqaleni kwa-1600, iziPopolo zokuqala zavulela iziMfundindalo ukuthi zihlonge izinto ezibuhhalazi ukwedlula lezo ezibuhhalazi noma zibukwa ngamehlo. Amakhulu ezinkanyezi ezakhuphululwa kanye nemiQongo eyahlongwa.

Ekupheleni kwa-1800, izithombe zomkhathi zavulela inhlolo yezomkhathi ngokujulile. Umuntu wayengalandela iNkanyezi ngeziPopolo aphinde futhi agcine ukukhanya kwayo kwidiski.

Ngalendlela babekwazi ukuhlonga iminingilizo yemiHlaba kanye nemiQongo.



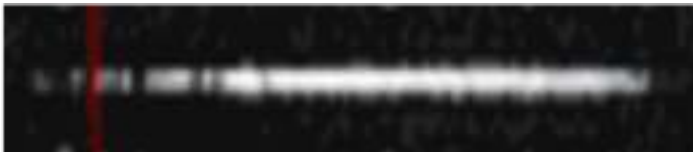
U-Newton
wenza imbobo
ekhethinini
ukuze
aqondise
imisebe
yelanga
kwiPrizimu.

woqondisa ukukhanya kwelanga kwiPrizimu
okwakhiqiza imibala yoThingo lwenkosazana.
Ngokubeka iPrizimu yesibili phakathi kweshidii
kanye nePrizimu yokuqala, wadlala ngeNgoni
ukuze akhiqize umubala omhlophe welanga.



umungcwu wokuqala
womQongo, wenziwa
u-Huggins ngo-1860.

wawukhombisa imigqa emithathu egqhamile.



Umungcwu
womunye
'umQongo'

owathwetshulwa u-Edwin Hubble ngabo-1920.
Ukhombisa imigqa'ensundu ebekwe phezu
kwengemuva eligqamile, elibukeka samungcwu
weziNkanyezi. okush'ukuthi 'lamafu aluthuli'
akusiwo amafu kepha izinkanyezi. lokhu sikubiza
ngo 'Mthalakazi'

Ukuqala kweNhlolokukhanya

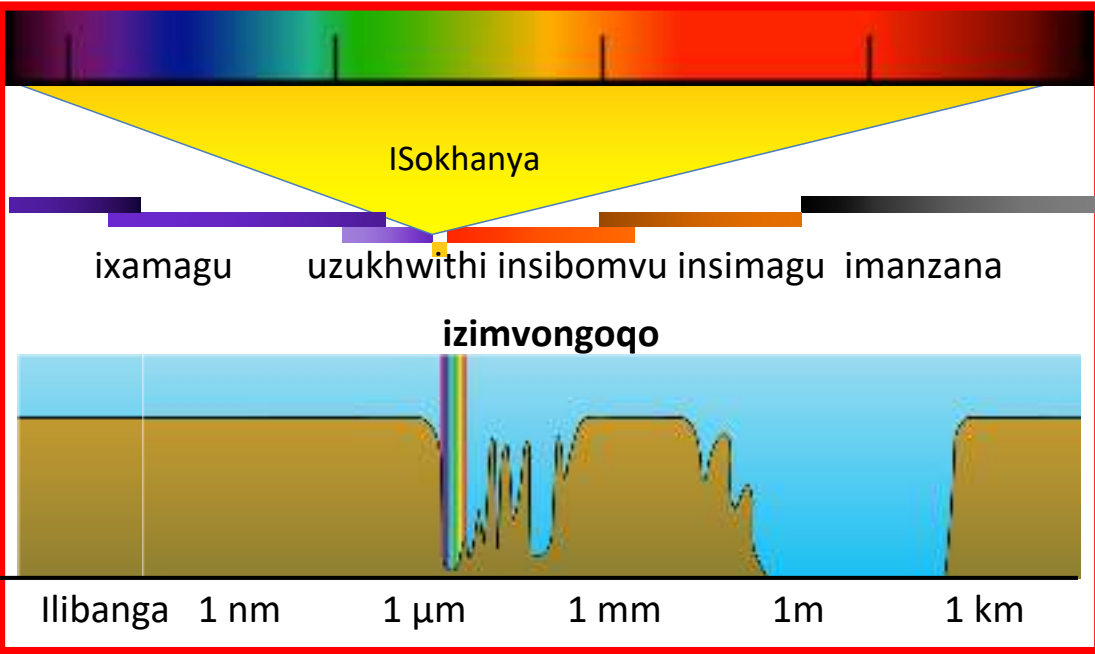
Ngonyaka we-1665, u-Isaac Newton, lowo owakhuphulula imithetho yomNyondo, wakhombisa ukuthi ukukhanya okuphuma eLangeni kwakwenziwe imibala ehlukile.

kwathatha iminyaka ukuthi iziMfundindalo zencike kulolulwazi ukuze zifunde ukukhanya okukhafulwa izinto eziseMkhathini.

Ibhudlukokukhanya okuyigama u-Newton alinikeza ukuKhanya okunhlalunhlaluziswe iPrizimu, liqukethe ulwazi ngokwakhiwa, ukushisa, kanye nesiluthi saloyonto ekhafula lokho kukhanya.

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

UMungcw



Ilibanga lokukhanya lisukela ngaphansi kwa-
1/1 000 000 000 m kwiXamagu kuya
ngaphezulu kwa- 1 km kwiManzana. UMungcw
obonakalayo usukela ku 0.4 uya ku 0.8 μm,
okuyingxanye encane yoMungcw ophelele.

IziThombe zasemKhathini zifakelwa imibala
yokunanezela, okuye kukhombise ingxanye
yoMungcw ongabonakali kulezoziThombe.

Umoya uvongoqekile kwizingxanye ezithile
zoMungcw. ukuze izimfunfindalo zibone
uMungcw ongabonakali, okhafulwa izinto
ezisemkhathini zisebenzisa iziPopolo zomkhathi
noma lezo ezizungeza umHlaba.

Ukukhanya okungabonakali

Isokhanya, limele ingxenye encane yoMungcwí.

Ukukhanya kungachazeka kalula ngelibanga lalo. kusukela kwelifishane kuya kwelide, ukukhanya kwenziwe

- Imanzana (lawo anqakwa uMabonakude kanye nemiSakazo, nomaKhala ekhukhwini),
 - Insimagu (njengalawa esifudumeza ngawo ukudla emakhaya),
 - Insibomvu (akhafulwa izinto ezifudumele, ibonakala ngezibuko ezibalulekile),
 - isokhanya (ilanga, amalambu)
 - uzikhwithi (isokhanya eliphuma elangeni elidala insunduko kanye nolovuka)
 - Ixamagu (ukubona amathambo).
- Into enamazinga aphezulu okushisa, ikhafula uMungcwí onelibanga elifushane.



UmThalakazi i-Sombrero
 uyinguzungasichompe equkethe umsuka
 oyingqumu owakhiwe izinkanyezi ezindala,
 kanye nothunqathunqa. Isinxele: isithombe
 esithwetshulwe iziPopolo ze-ESO 1.5 m
 ububanzi kwiSokhanya. esokudla: isithombe
 sombala ongewona: isithombe esithathwe
 izipopolo i-spitzer kwinsibomvu (obomvu),
 oshishilizwe kwisithombe esithathwe izipopolo
 i-Hubble kwisokhanya (oluhlaza).



IsiXheke semThalakazi i-
 Phoenix. Isithombe
 semiThalakazi
 (oncombo) sibekwe
 phezu kweseXamagu
 esathathwa izipopolo i-
 Chandra, esiveza ifu
 elikhulu elinamazinga
 okushisa afinyelela
 kwizinkulungwane.

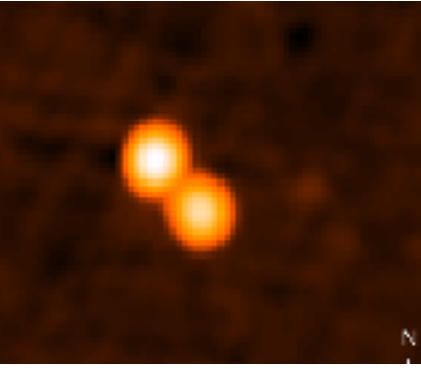
Izithombe kuMungcwí Ongabonakali

Ubukomkhathi kumungcwí ongabonakali ofana neManzana, iNsimagu, iNsibombvu uZukwithi, iXamagu, noma iMisebentathu, ivumela oSosayensi ukuthi bazi kabanzi ngendalo yezinto ezisemkhathini.

Isampula, uHoyana lothunqathunqa lufudumezwa iziNkanyezi lufinyelele emazingeni angaphansi kwawomzimba womuntu. Izinto ezicabazeke kangaka zikhafula kwiNsibomvu, kanti iziNkanyezi ezinamazinga okushisa aphakathi kwa-3 000 kuya kuma-50 000 zikhafula kwiNsokhanya.

Koluny'uhlangothi, uthunqathunqa oluthibeliwe lufudumezwa lifike emazingeni okushisa ayizinkulungwane noma ngaphezulu. Lugqhama kakhulu kwiXamagu.

Isithombe seManzana
esithathwe i-VLA se-3C273.
Ngo-1963, uMartin
schmidt wakhombisa ukuthi
phakathi nendawo kwe-
3C273 kukhona
insaNkanyezi elundwa,
ekudana. Lesi kwakuyisiPhinqi
sokuqala ukuthi sikhushulwe.
Isithombe kwiSokhanya
esithathwe i-Hubble
sikhombisa ujikijelotho
olusuka kwisiPhinqi.



Isithombe semiThalakazi
emibili esithathwe i-Hubble
kwiSokhanya eyakhushulwa
isizungezi i-IRAS kwiNsibomvu.
Ukugqhamama kwayo kuphindeke
ngokwe-100 kwiNsibomvu
kuna kwiSokhanya, kanti
zibizwa nge-ULIRGs
(ImiThalakazi ensibomvu
ekhafula kanje). Eminigi
imiThalakazi inesingani
neminye imiThalakazi



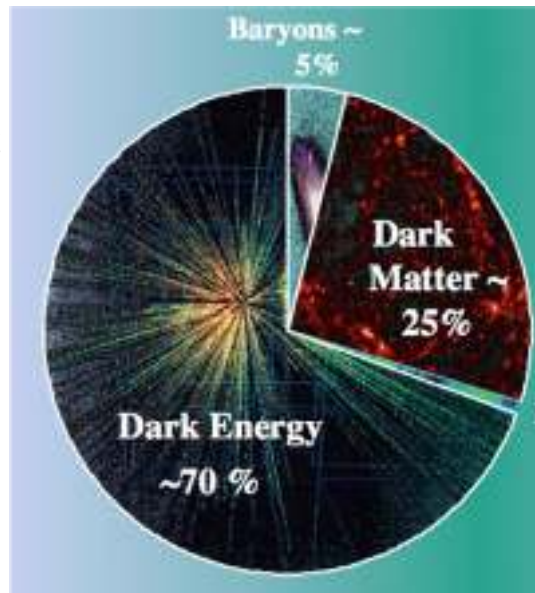
Ezinye izinto kumKhathilibe zifihlekile, kuzekuba oSosayensi bazibuke ngezipopolo ezizaze 'kwingcwi efihlekile'. Izinto ezibandaqa noma ezishisa-bhe zikhafula kwiNgcwi efihlekile kanti zakhushulwa ngeNgcwi yazo engabonakali. Kamuva, lapho oSosayensi babebuka emkhathini ngezipopolo ezinkulu eziqoqa ukukhanya okuningi futhi ezizaze, basebekwazi ukubona lezizinto kwiNgcwi ebonakalayo. kwakuyilesisimo nakwiziPhinqi, isampula, zakhushulwa kwiManzana, kanye nemiThalakazi equkethe ezikhafula kwimisebentathu, lapho khona imisebentathu yahlongwa maphambili kokukhuphulwa komThalakazi.



Usonteko loMnyondo
i-LRG 3-757.
Isangqo esilundwa
isithombe
esihlanakezelwe
somThalakazi
olundwa, ongemuva
komThalakazi
oyinguzung'ebomvu.

UmThalakazi oyinguzunga oqukethe uTho
olungabonakali usebenza njengeNgilazi
yokukhulisa ukukhanya okuqhamuka
kumThalakazi ongemuva kwawo. ukukhweceka
kwemisebe kukhweciswa umNyondo njengoba
ayebhulile u-Einstein ngo-1915.

Izibalo zikhombisa
ukuthi umkhathilibe
wakhiwe: imPekumpeku
esithekile yenza cishe
u-70% womKhathilibe,
25% inJelwane, kanti
umKhahilib'
esiwubonayo
(imiThalakazi kanye
kanye nokutholakala
kwinQeke) kwenza u-
5%.



UTho kanye neMpekumpeku Engabonakali

Ezinye zezimilo zomkhathilibe zikhomba ukuthi kukhona itshe loTh'olungahlonzeki, elubizwa ngokuthi 'InJelwane', obonakala kuphela ngomNyondo wawo ophazamisa ukunyakaza kwalokho esikubonayo.

Ososayesi abavumelani ukuthi lolutho akusizo iziNkanyezi, imiHlaba emincane, amafu ansundu, iziGwinqi, noma ungoTho.

Ubuko lemiThalakazi esekudeni kukhombisa ukuthi ukulwiza komKhathilibe kuyakhawuleza. Incazelo ekuvunyelwana ngayo ukuthi kunohlobo lweMpekumpeku olungaziwa oludala lomkhawulezo, ebizwa nge 'mPekumpeku engabonakali'.

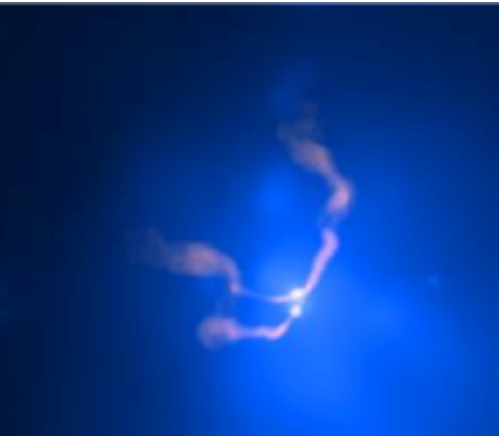
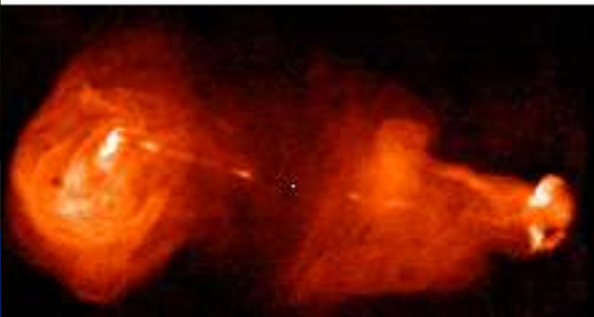
Amanye amaTiyori awadingi uTho noma impekumpeku engabonakali, kodwa kumele akwazi ukuchaza lokhu esikubonayo njengoba lawomTeyori ekuvunyelwana ngawo enza.



Imibuzo



Iziphi iziThombe
ezithwetshulwe
kwiSokhanya?



Izimpendulo zikwi
overleaf

Isithombe
somQongo i-cat
eyes nebula
esithwetshulwe
kwiSokhanya.

Isithombe somThalakazi
i-M31 esithathwe
ngeziPopolo zozuKhwithi
ezazikwisibuki seNASA i-
Swift

Isithombe
senhlanganisela
samafu aluthuli
atholakala kwinqeke
yomkhathi esithathwe
kwiNsibomvu
ngeziPopolo i-Spitzer.
Izishimanqa ezibomvu
izindawo lapho
kudaleka iziNkanyezi
khona.

isiThombe
esithathwe
kwiManzana,
esithathwe i-VLA
sikhombisa isiShwila
lomThalakazi
omanzana i-3C353.

Isithombesenhlanganisela
a yeXamagu (olundwa) /
yeManzana (obomvana)
sesiXheke semThalakazi
i-Abell 400. IziShwila
zicosuka kwimpakathi
kumnyombombili
kumThalakazi osendeni.

UMkhathilibe Ephaketheni Lami No. 2

LeNcwajana yabhalwa ngowezi-2017
ibhalwa u-Grażyna Stasińska wase-Paris
Observatory (France) yase iningilizwa u-
Stan Kurtz wase-UNAM Radio
Astronomy Institute in Morelia (Mexico).

Ikhava: Ingxenye yeningizimu yewalakahla le-
Chandra, isithombe esiwumahlanganisela
esithathwe kwiXamagu ngeziPopolo
zomkhathi i-Chandra. Ikhombisa amakhulu
eziPhinqi asekudeni okungango-12 billion
light-years.

Izithombe eziningi kuleNcwajana zithathwe
kuziPopolo i-Hubble, i-Spitzer, kanye
neChandra, kanye nakwizipopolo zemanzana i
VLA (Very Large Array radio).



Uma ufisa ukufunda kabanzi
ngaloluchungechunge knaye
nezihloko ezethulwe
kuleNcwajana, sicela
uvakashele u-

<http://www.tuimp.org>

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