Joe Mazzarella <joema@caltech.edu>

17 févr. 2023 07 h 45

Dear Donald,

Thank you for your inquiries about how NED computes physical diameter

from angular diameter. It is a bit complex, with three major categories.

The summary below outlines how this is done.

First for the case of NGC 3753 from one of your prior messages:

>When there is no independant distance method, i presume you use the Hubble

>distance. If so, why the value of diameter on your site is always a little

>greater than the one i calculatd. Exemple, NGC 3753, Hubble distance is

>133.27 Mpc and the apparent diameter is 120", so

(120/3600)*(pi/180)*133.27

>Mpc = 77,53 kpc. The value indicated on the site is 79,12 kpc.

>Thanks and have a good day.

we'll refer to this query report

https://ned.ipac.caltech.edu/byname?objname=NGC+3753&hconst=67.8&omegam=0.308&omegav=0.692&wmap=4&corr_z=1

And for NGC 4497:

>Diameter indicated on your site is 133.29" and a distance of 20.24

Mpc. The

>diameter in kpc should be (133.29/3600)x(pi/180)x20,240 kpc, which gives

>13,08 kpc. How do you arrrive at the valeu 9,67 kpc?

we'll refer to this query report

https://ned.ipac.caltech.edu/byname?objname=NGC+4497&hconst=67.8&omegam=0.308&omegav=0.692&wmap=4&corr_z=1

Both of these galaxies have no redshift-independent distance available

(as for most galaxies),

and have redshift z <= 0.5.

Cases like this use a distance estimated from correcting the recession

velocity

(cz) for peculiar motion using the local flow model of Mould et al.

(https://ui.adsabs.harvard.edu/abs/2000ApJ...529..786M/abstract).

This can be found (with the above reference) in the Redshifts tab listed as

"D (Virgo + GA + Shapley)".

For NGC 3753:

D (Virgo + GA + Shapley) = 136.00 ± 9.52 Mpc,

which for angular diameter 120" gives the physical diameter:

(120.00/3600)*(pi/180)*136.00 = 0.07912 Mpc = 79.12 kpc.

This is the value in the Overview tab.

Note also that D (3K CMB) = 133.27 Mpc in the Redshifts tab is the

value listed in the Overview tab as "Hubble Distance (CMB) [Mpc]".

This gives the physical diameter you computed:

(120.00/3600)*(pi/180)*133.27 = 0.077533 Mpc = 77.53 kpc.

Likewise for NGC 4497: In the Redshifts tab,

D (Virgo + GA + Shapley) = 14.96 ± 1.05 Mpc

which for angular diameter 133.27" gives the physical diameter:

(133.27/3600)*(pi/180)*14.96 = 0.009665 Mpc = 9.67 kpc.

This is the value in the Overview tab.

Note also that D (3K CMB) = 20.24 Mpc in the Redshifts tab is the

value listed in the Overview tab as "Hubble Distance (CMB) [Mpc]".

This gives the physical diameter you computed:

(133.27/3600)*(pi/180)*20.24 = 0.01307729 Mpc = 13.08 kpc.

The second most common situation is for objects with redshift > 0.5.

In this case, we'll use example SDSS J135613.80+182357.9 at z = 3.927:

https://ned.ipac.caltech.edu/byname?objname=SDSS+J135613.80%2B182357.9&hconst=67.8&omegam=0.308&omegav=0.692&wmap=4&corr_z=1

For high redshift objects, the local flow model is not relevant, and the

angular-size distance is used, listed in the Redshifts tab under

Cosmology-Corrected Quantities. For this object:

Angular-Size Distance = 1.48e+03 Mpc.

*** The UI is missing the unit label. Should read: "1.48e+03 Mpc; (m-M)

= 40.85 mag".

With angular diameter of 2.70", this gives a physical diameter of:

(2.70/3600)*(pi/180)*1.48e+03 Mpc = 0.019373 Mpc = 19.37 kpc.

This is the value in the Overview tab (within 0.01 kpc round-off error).

Finally, for objects having redshift-independent distance measurements,

physical diameters are derived using the average (simple arithmetic mean)

of the available distances. For example, for NGC 1068:

https://ned.ipac.caltech.edu/byname?objname=NGC+1068&hconst=67.8&omegam=0.308&omegav=0.692&wmap=4&corr_z=1

In the Distances tab there are 11 measurements with mean = 10.582 Mpc.

With angular diameter of 540.00", this gives a physical diameter of:

(540.00/3600)*(pi/180)*10.582 Mpc = 0.02770 Mpc = 27.7 kpc.

This is the value in the Overview tab.

Users are encouraged to use whatever distance (thus scale) estimate you

think

is most appropriate for a particular galaxy. That is why so many options

are

provided, but we hope this clarifies how the 'quick-look' estimates are

computed.

We recognize the need to improve documentation in the UI for how these

derived quantities are estimated, and your inquiries have been helpful

as we plan

future improvements. Thanks.

Joe, for the NED team

Dr. Joseph M. Mazzarella | NASA/IPAC Extragalactic Database, Science Lead

MS 100-22, IPAC, Caltech | Pasadena, CA 91125 | 626-395-1861

mazz@ipac.caltech.edu | https://orcid.org/0000-0002-8204-8619

On 2/6/2023 10:45 PM, pelletierdonald806@gmail.com wrote:

> Donald Pelletier (pelletierdonald806@gmail.com) sent a message using the

> contact form at /contact/NED.

>

> Diameter indicated on your site is 133.29" and a distance of 20.24

> Mpc. The

> diameter in kpc should be (133.29/3600)x(pi/180)x20,240 kpc, which gives

> 13,08 kpc. How do you arrrive at the valeu 9,67 kpc?

>

> _____

> NED-HelpDesk mailing list

> NED-HelpDesk@lists.ipac.caltech.edu

> https://lists.ipac.caltech.edu/mailman/listinfo/ned-helpdesk

Donald Pelletier <pelletierdonald806@gmail.com>

17 févr. 2023 08 h 58

à Joe

Thank you very much Mr. Mazzarella.

I'll read all of that carefully and update the wiki (french) page about the distance and diameter of the galaxies one day.

--

Donald Pelletier

http://dpelletier.profweb.ca/