DiskImage

DiskImage[*a*, *ϑo*, *α*, *m*, *mdot*, *imageSize*, *maxBardeenCoordinate*, *radiusLimit_* : 0, Options]
returns a list containing tables with information specified by the option 'Output'->{'information1', 'information2', ...}. Geodesics are specified by (dimensionless) *a*, *ϑo* (distant observer's *θ*) and maximal Bardeen coordinate that is shown. The number of geodesics to be generated is specified in *imageSize* in the form {xsize, ysize}. Disk is specified by BH mass *m* (in solar mass by default), matter inflow *mdot* and parameter *α* (both in Shakura & Sunyaev definition by default).

DiskImage[*a_*, *ϑo_*, *α_*, *m_*, *mdot_*, *imageSize_*, *maxBardeenCoordinate_*, OptionsPattern[]] function provides the easiest way of generating an accretion disk image in the package. The input parameters are the dimensionless angular momentum *a*, the observer's polar coordinate *ϑo*, the constant characterizing the efficiency of angular momentum transport *α*, the black hole mass *m*, the mass influx *mdot*, the image size *imageSize* in pixels as a list of length 2, the maximal Bardeen coordinate, the optional greatest radius (in G=c=M=1 units) at which the disk near the black hole is visible *radiusLimit*, and an options pattern.

The following options can be given:

"InputUnits"	"NovikovThorne"	This option specifies the units in which the user has provided the input. The default option is "InputUnits"–>"NovikovThorne", which expects the mass M to be given in geometrized units and the mass influx mdot to be dimensionless, $\dot{m} := \dot{M}/1014$ kg /s. Other accepted options are "InputUnits"–>"SI", "InputUnits"–>"CGS", and "InputUnits"–>"ShakuraSunyaev", the first two expecting SI and CGS units respectively, the last one expecting M to be given in solar masses and mdot to be given in multiples of the critical mass influx; the mass influx at which the Eddington luminosity is reached.
"OutputUnits"	"SI"	This option changes the units of the output functions (temperature and flux density). As of June 2024, only the default option "OutputUnits"–>"SI" is supported.
"rUnits"	"BHMass"	The output functions of DiskParams are functions of radius. This option changes the units of radius these functions expect. The default option is "rUnits"–>"BHMass", which expects the dimensionless r used throughout chapters 1 and 2, r = Rc2/(GM), where R is radius with dimension. Other supported options are "rUnits"–>"SI", "rUnits"–>"CGS", and "rUnits"–>"ShakuraSunyaev", the first two using the meters and centimeters as units respectively, and the last one using Shakura and Sunyaev's definition, $r = Rc^2/(6GM)$.
"Grid"	True	Specifies whether a grid of lines of constant r and *φ* should be generated over the data. Takes a boolean value.
"Rotation"	"Counterclockwise"	Sets the direction of rotation of the black hole. The default option is "Rotation"–> "Counterclockwise". The opposite is "Rotation"–> "Clockwise".
"PhiRange"	{-Pi, Pi}	Sets the range of output of the azimuthal angle. The default is "PhiRange"–> {−*π*, *π*}, which starts the coordinate at 0 and does not take the modulus of it after full windings. Typical options could be {−∞, ∞} or {0, 2*π*}, but other option values in the format {bottomvalue, topvalue} are valid as well.

"Output"	{MaximalFrequency}	Takes the list of keys to the association returned by the ObservedDiskElement function. The output will be a list of matrices with values corresponding to these keys. The default option is "Output"–>{"MaximalFrequency"}.

Tech Notes

KerrImages

Related Links

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See Also

KerrNullGeoDistant ▪ **DiskParams** ▪ **ObservedDiskElement** ▪ **GenerateTemplate** ▪ **DiskImageFromTemplate** ▪ ⊕

Related Guides

KerrImages

Examples Initialization

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Needs["BlackHoleImages`"]
```

Basic Examples

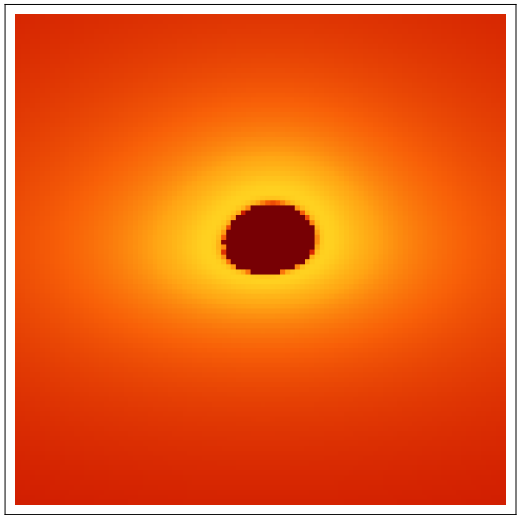
More Examples ▹

Get the 100 x 100 pixels image of the physical temperature of an accretion disk near a black hole with a solar mass and the spin parameter *α=0.9*. The matter influx is 10^14 kg/s, the parameter *α=0.1*. We are watching the black hole from $\theta o = \pi/3$ and the maximal visible Bardeen coordinate is 20.

```
In[39]:= img = DiskImage[0.9, π / 3, 0.1, 1500, 1, {100, 100}, 20, "Grid" -> False, "Output" -> {"PhysicalTemperature"}]
```

```
In[40]:= ArrayPlot[Reverse[img[[1]]], ColorFunction -> "SolarColors"]
```

Out[40]=



More Examples

Metadata

New in: XX | Modified in: | Obsolete in: