

COPYRIGHT GUIDE FOR

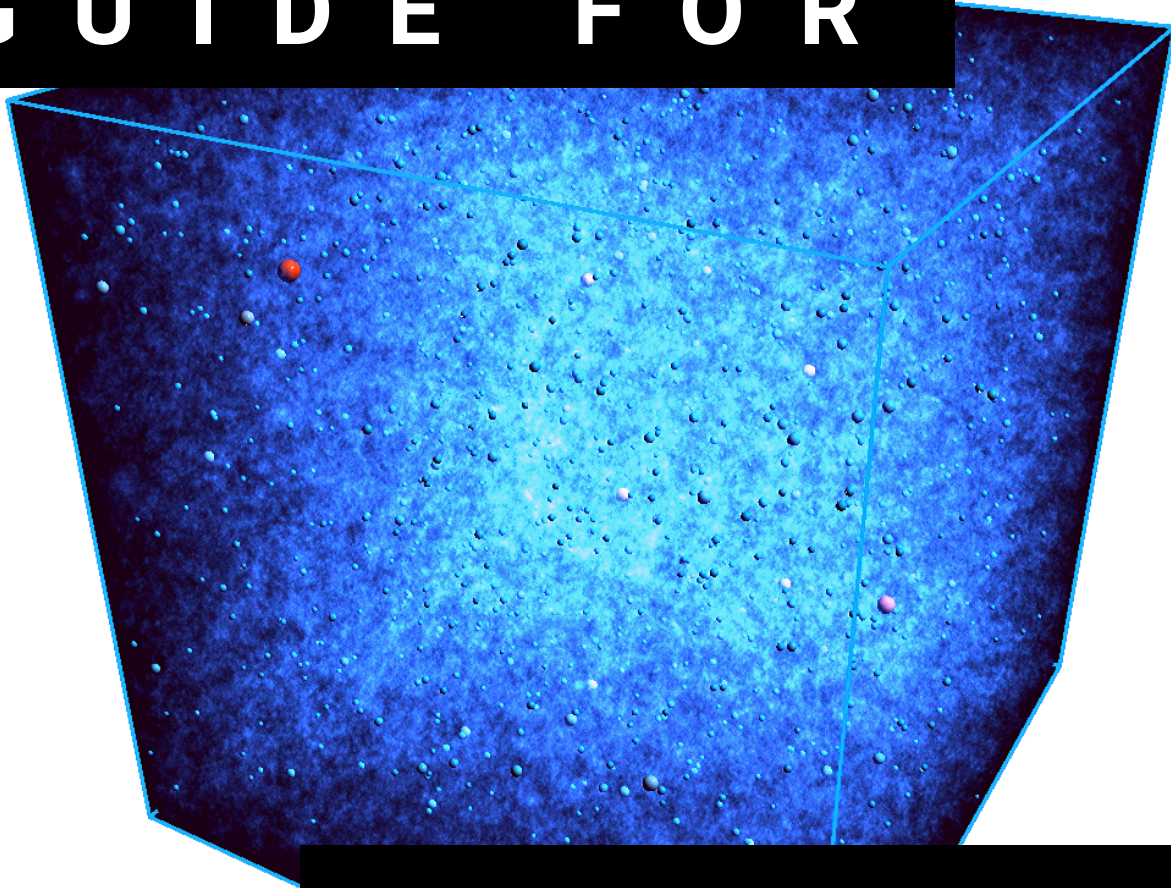


IMAGE 1: Visualization of the halos in the Outer Rim simulation at redshift.

SCIENTIFIC SOFTWARE

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 Software
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Preferred Description:

"A brief copyright guide on scientific software. This guide covers how to make it easier for others to use your software and how to build on the software that others have written."

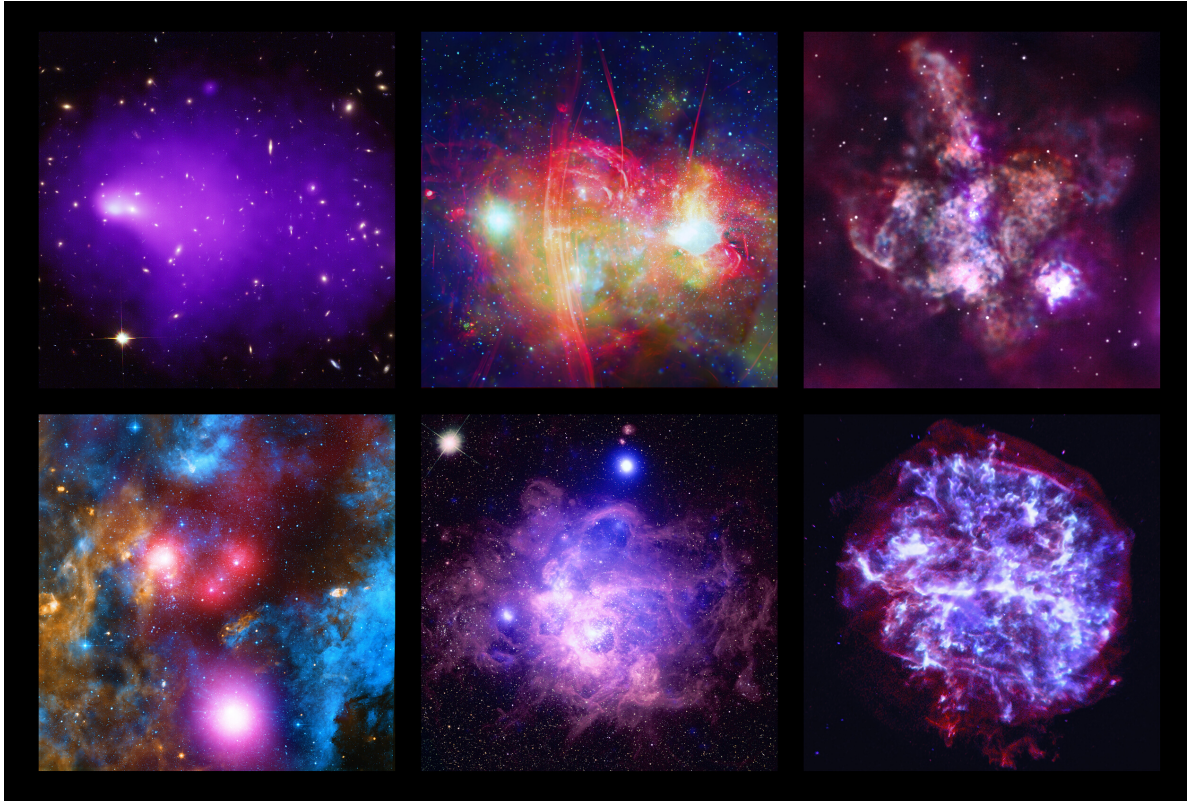


IMAGE 2: NASA's Chandra X-ray observatory celebrates its 20th anniversary.

WHO IS THIS GUIDE FOR?

If you write or use scientific software in the course of your work, this guide is for you! It covers how you can make it easier for others to use your work and how you can build on the software that others have written.

We'll explain how copyright applies to software and the legal limits you should be aware of. We'll also explain how to make sure others can easily and legally use software you have written, and how to make sure you are allowed to use software someone else wrote.

Along the way, we'll point you toward other helpful and free resources about this topic.

This guide is aimed at scientists in the United States – we solely focus on U.S. copyright law. If you're outside the United States or have questions about how copyright applies across international borders, consult a local lawyer.

WHAT DOES COPYRIGHT HAVE TO DO WITH SOFTWARE?

Copyright laws give authors & creators of certain works the right to exclusively control the use of their work for a limited time.

Who Owns the Copyright?

If a work is copyrighted, someone owns the copyright in that work. This owner generally decides who can use the work and how. There are a few exceptions to that rule:

- If multiple people created the work together, then they are all considered owners of the copyright as long as they intended for their contribution to be combined in that way. (This might look something like the **AstroPy Collaboration**.)
- If someone created the work in the course of their employment as one of their regular duties, then their employer is probably the owner of the copyright.
- If the copyright owner would be the federal government (usually if a government employee created the work), then the work is **not** subject to copyright protection!

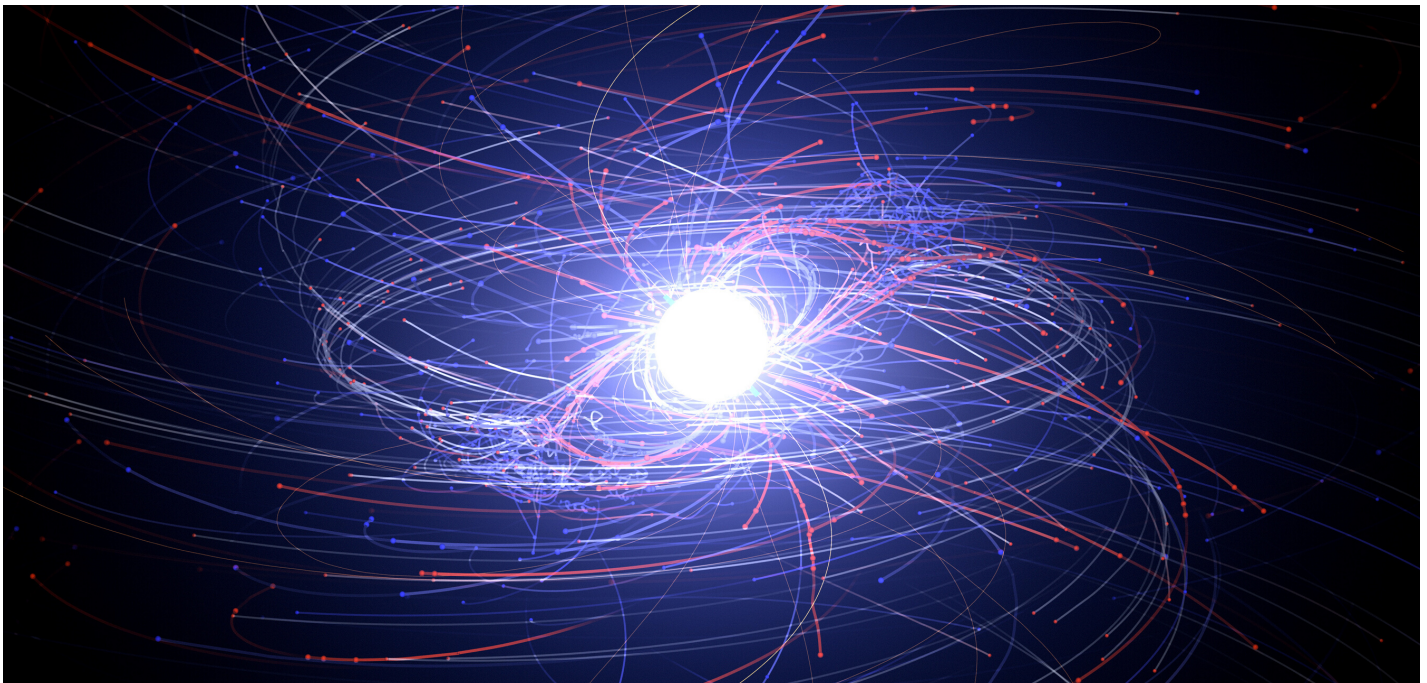


IMAGE 3: “Pulsar in a box” simulation tracks electrons (blue) and positrons (red) as they interact with magnetic and electric fields around a neutron star.

What Works Does Copyright Apply To?

Works subject to copyright protection include any original, creative, and fixed work – including books, photographs, and software. This protection *applies automatically* to all newly-made creative works, even if the creator doesn't take any steps to secure or document copyright protection.

By default, only the owner of the copyright may copy or change the work, or distribute it to the public (whether for sale or for free).

How Does Copyright Apply to Software?

Copyright covers the creative portions of any software, but not the underlying facts or ideas. So while copyright protection wouldn't apply to a concept like Particle-in-Cell simulation, it would apply to particular implementations of the Particle-in-Cell model, and certainly to the comments describing it.

The longer, more complex, and more creative the code is, the more likely it is to be protected. Code that is short, directly tied to underlying equations, or simply a standard implementation of a well-known algorithm is less likely to be protected.

Even if the actual lines of code aren't protected by copyright, the general structure and organization of the code might be protected.

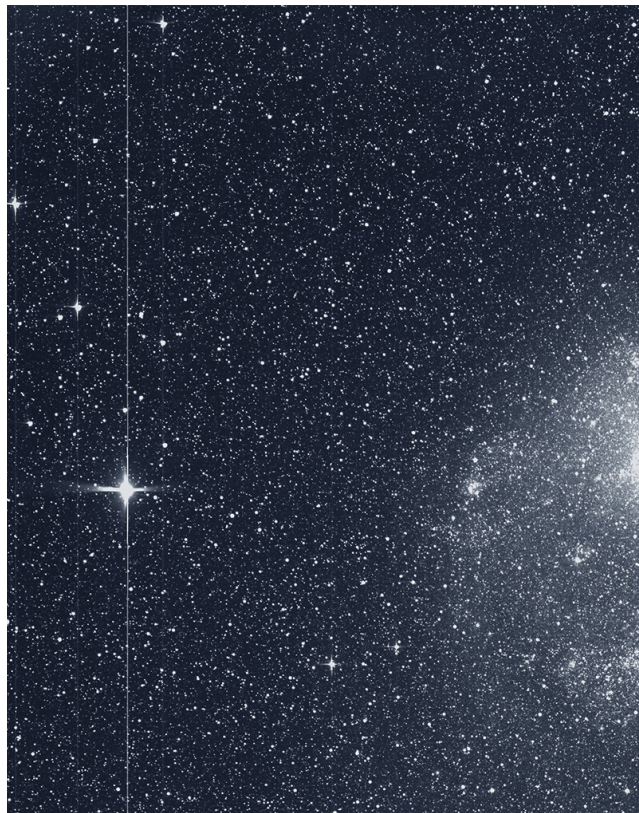


IMAGE 4: Part of the "first light" science image from the Transiting Exoplanet Survey Satellite (TESS).

What About Licenses?

Only the copyright owner can give legal permission for others to copy, modify, or distribute the work.

This legal permission is known as a license.

Be aware that copyright ownership (and licenses) can change from one software version to the next. It's important to make note of these changes when reusing software written by others.



IMAGE 5: First image of a black hole, using Event Horizon Telescope observations.

WHAT SHOULD I DO WITH THE CODE I'VE WRITTEN?

**This section assumes that you own the copyright to the code!
Only the copyright owner can license a work.*

Make it Easy for Others to Find and Cite

Generally, if you want people to be able to reuse your code, you should make a stable version of it easy to find and cite. You may already make your code available on a platform like GitHub, but because software (and software licenses) may change over time, we recommend archiving releases of your code by depositing **the necessary files** in an **archive like Zenodo**. This will give you a persistent identifier that you can share with others and cite in papers too.

Make it Legal for Others to Use

If you want other people to be able to use your code, you should include a license saying so. In most cases you'll want an open-source or free software license, which will ensure that the software **"can be freely accessed, used, changed, and shared (in modified or unmodified form) by anyone."** The Open Source Initiative maintains a **great list of open-source licenses** that work well for software, as well as a **FAQ section** on how open-source licenses work. (In fact, some people define open source as software that uses an OSI-approved license.) If you're not sure which open-source license to use, consult **this guide on choosing a license**, which was created by the GitHub team!

Frequently Asked Questions

I put my code online for free. Isn't it obvious that people can use it?

Unfortunately, no. Copyright law is very specific and **implied licenses** are difficult to establish. Making your work publicly available for free is not enough to give people legal permission to use it. Many people and companies will not use software that doesn't have a license, because they are unsure if they legally can or not. Always include a license!

Do I have to use one of these licenses? Can't I just write that I give people permission?

Writing that you give people permission might not be enough to prevent future complications. Expressly licensing your software not only gives people permission to use your work, but also makes sure you won't be legally responsible if there are problems with your code. Many people and companies will not use software that doesn't use a standard license, because they don't want to commit the resources to investigate what it legally means. We **strongly recommend** using an existing license rather than trying to write your own.

Can I license my code under a Creative Commons license?

Creative Commons licenses are not for software. They don't deal with source code, and they're not compatible with common software licenses (like those approved by the Open Source Initiative).

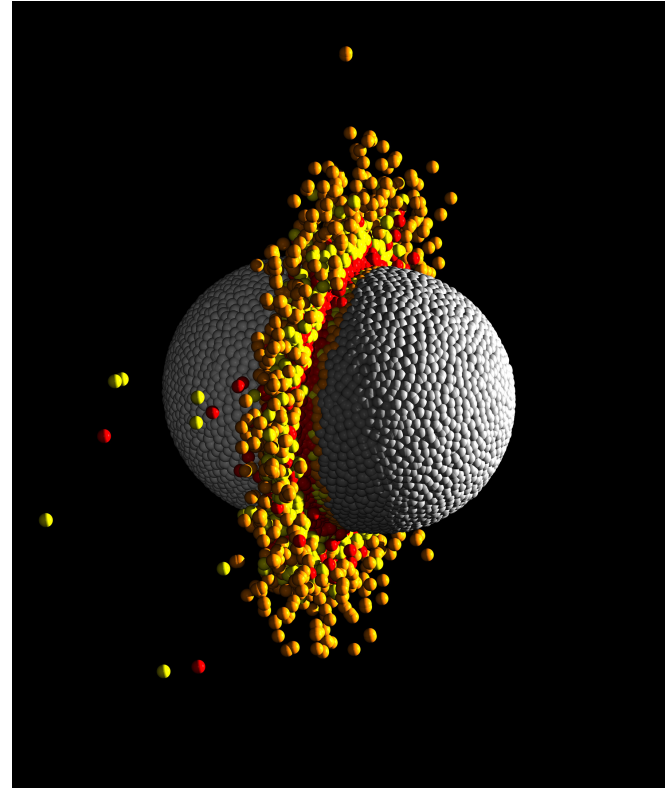


IMAGE 6: Simulation of collision between two exoplanets.

I want people to credit me when they use my work. Is there a license for that?

If what you want is to make sure that your name travels with the code, the most common open-source licenses start with a boilerplate copyright notice:

Copyright (c) [year] [fullname]

This is where you can indicate the name of the copyright owner. Many licenses then require that the copyright notice and the license text be included with all subsequent copies of the work.

If you want belt-and-suspenders coverage, consider using the **Attribution Assurance License**, which is approved by the Open Source Initiative.

Frequently Asked Questions (continued)

How do I make sure people cite me and my software in their papers?

None of these licenses will guarantee that someone writing a paper and using your software will cite you, and different publishers have different policies around how to cite software (e.g. **AAS**). However, you should absolutely request that they do so on the page where you make your work available!

Although software citation is not yet standardized, we recommend including a file containing metadata (e.g., a **Citation File Format (CFF) file**) in the root of your software repository. Your metadata file should contain all the information needed to properly cite your software. Include an identifier in your metadata file, **such as a DOI**, so people cite the archived copy of your work where the license will be found. Another type of metadata file is a **CodeMeta file** that more comprehensively describes your code; this will also contain information to help people cite your software. For more information on citing software, check out **this paper** from FORCE11 and **this blog post** from the Software Sustainability Institute.

We do not recommend putting a citation requirement in your actual license. People might want to use your work in a context where there won't be a resulting publication or standard scientific citations will not apply. Putting your citation requirements in your license may even impede software preservation, since that's a use that doesn't directly result in scientific writing. Modifying a standard license will also lead to decreased usage of your software. The Open Source Initiative approves certain licenses partly because they're very compatible with other licenses, so we strongly recommend not making changes to the standard licenses.

Can I get rid of my copyright somehow?

Sort of, but we don't recommend it. **CC0** is the only Creative Commons license that can be applied to software, and it waives your copyright in the work. Waiving your copyright means that anyone can use your work for any purpose (including commercial or distasteful purposes) without crediting you. Use it at your own risk, and make sure to read the **CC0 FAQ** first!



IMAGE 7: The Large Synoptic Survey Telescope (LSST) will take the deepest, widest image of the Universe.

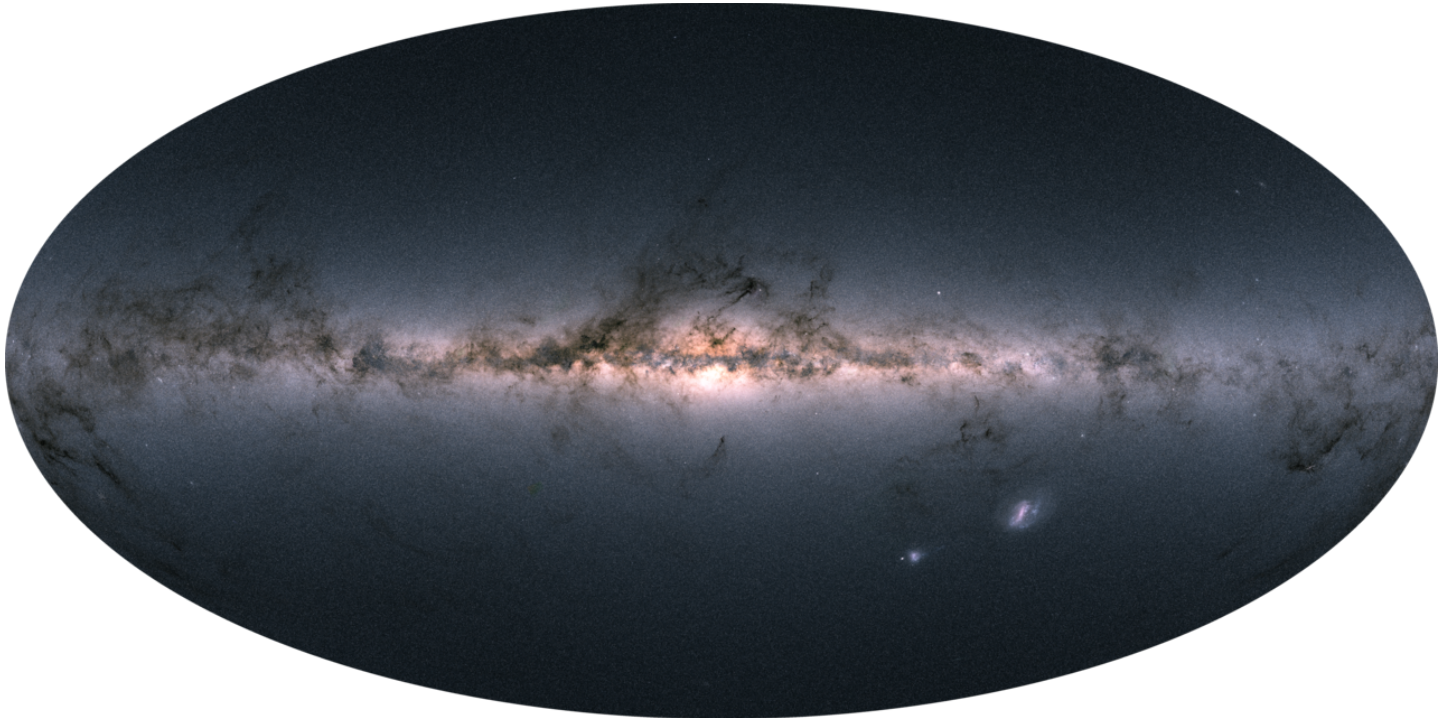


IMAGE 8: This map of the Milky Way from Gaia DR2 compiles the fluxes measured in the Gaia G, GBP and GRP photometric bands.

WHEN CAN I USE CODE SOMEONE ELSE HAS WRITTEN?

Is a License Included with the Code?

If you want to use code that someone else has written, you should check to see if a license was included with the code. Software licenses tell you what you can and cannot do with the software shared under that license. There are several types of software licenses. Some licenses place restrictions on when you can use, modify, or share software, while other licenses have no restrictions on the use, modification, or sharing. Many publicly available software programs are shared under an existing open source license. Some popular, widely-used open source licenses that you may encounter are approved by the **Open Source Initiative**.

If you want to use code that is shared under a license, you should read that license carefully. Violating a license may make you liable for copyright infringement.

What Can I Do If There Is No License Included with The Code?

If you find a software program that has been shared without a license, you do not have legal permission from the creators of the software to use, modify, or share that software. Copyright protection automatically applies to all newly-made creative works, even if the creator of the work did not seek protection or draft a license. If you want to use a software program that has been shared without a license, you have some potential options.

First, you may ask the creators of the software program to add a license to their work. Often, software creators forget to add a license to their work or are unaware that users are unable to use, modify, or share unlicensed works. If you ask nicely, via something like a GitHub issue, software owners may be happy to add an open source license to their work. If you believe that the copyright owners want to make their software program available without any restrictions, you could even suggest that the software be shared under a specific open source license. An example email that you could send to the creators asking them to add a license to their work is listed below:

Dear [creator of the software program],

Hello, my name is [your name]. I am a researcher from [your organization]. I would like to use [software program] for my research project [description of research project]. However, there is currently no license included with your software program, which means that default copyright rules apply, and I am unable to use, modify, or share your software.

Would you please consider adding an open source license to [software program] so that I, and other researchers, could use your program? One short and simple permissive license that many software creators use is the MIT License (<https://choosealicense.com/licenses/mit/>). If you would like information about which open source license best fits your needs, GitHub has created a guide detailing how to choose the right license for your program, which can be found at <https://choosealicense.com/>.

*Thank you,
[Your Name]*

You can also ask the copyright owners to add a CFF file if they do not have one so you can cite them later after you have used their software.

If the creators of the software program are unable or unwilling to add a license to their work, you can negotiate a private license with the copyright owner. Columbia University Libraries has created **a guide** for requesting permission from a copyright owner to use a copyrighted work. If you are unable to negotiate a private license, you can choose not to use the unlicensed software and instead find an alternative software program that is currently shared under an open source license.

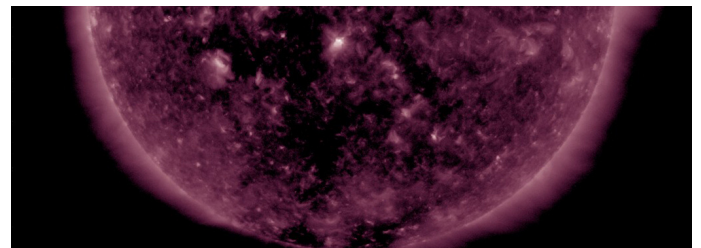


IMAGE 9: Our sun captured by NASA's Solar Dynamic Observatory.

Does Fair Use Apply to My Use of Copyrighted Code?

If you use a copyrighted software program without the permission of the copyright owner, your use of the software may be protected by the **fair use doctrine**. The fair use doctrine allows individuals to use a copyrighted work without permission from the copyright owner. To determine whether a use is fair, courts weigh the following four factors:

1. the purpose and character of the use, including whether such use is of a commercial nature or is for nonprofit educational purposes;
2. the nature of the copyrighted work;
3. the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and
4. the effect of the use upon the potential market for or value of the copyrighted work.

Copying, modifying, or sharing computer programs for research purposes qualify as fair use. However, determining whether someone is engaging in fair use of a software program depends on the particular circumstances of that use, so a single fair use cannot cover every research use.

For example, courts have said fair use permits users to copy software in order to study how it works and create new compatible or interoperable technologies. On the other hand, simply copying or sharing commercial scientific software so it can be used by a colleague for its original purpose (i.e., in the context of conducting the research the software was designed to enable or support) is very unlikely to be a fair use.

If you would like more information about fair use, the **Code of Best Practices for Fair Use for Software Preservation** includes general information about copyright, fair use, and other legal issues related to software. Stanford University Libraries has published a **guide** that provides an overview of the fair use doctrine. The American Library Association also provides a **fair use evaluator** that may assist you in determining if your use of a copyrighted work is a fair use.

What Happens if I Violate a Software License or Use Software Without Permission?

If you violate a software license or use, modify, or distribute a copyrighted software program without permission from the copyright owner, you may be liable for copyright infringement. Such lawsuits are quite uncommon, but if the copyright owner chooses to sue you, you can be liable for the cost of licensing the software, or for any money you may have made as a result of your use. You may also be liable for statutory damages, or damages set by the Copyright Act to be between \$750-\$30,000 per work if the work was registered. If you are worried that your particular use of a copyrighted work may violate its license or about copyright infringement, you should consult an attorney.

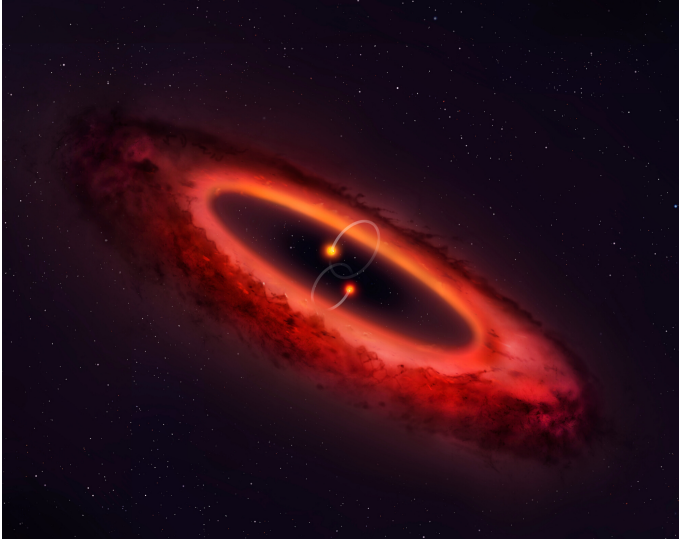


IMAGE 10: Double star system and surrounding disc.

Frequently Asked Questions

Do I have permission to use code that is freely available on a public software hosting website, such as GitHub?

Not necessarily. Making a software program freely available on a public software hosting website, such as GitHub, does not automatically grant users permissions to use, modify, or share that program. You will only have permission to use code if permission is granted by the copyright owner, such as through a license.

How can I check if a license applies?

Most creators of publicly available software programs place their license text in a file named LICENSE.txt (or LICENSE.md) in the root of their project repository. Other projects may include information about their license in their project README. If you are unable to locate a license for a software program, you may reach out to the software creator to ask if a license is included with their program.

Do I have to cite source code when I publish my research findings?

You're not legally required to. **But morally, you definitely should.** Software citations are important because they facilitate the dissemination of code, improve software sustainability, ensure authors are acknowledged for their work, and allow researchers to reproduce someone else's research. Some software creators have licensing terms and conditions that require the use of the software to be acknowledged or cited in any publications of results produced using that software. If software creators do not specify citation terms, you should still cite to the software if the software played a critical part in or provided something novel to your research. You can see some examples on how and when to cite software from the astronomy community [here](#).

Is a software program open source if it is written in an open source language?

No. Even if a software program is written in a programming language that has implementations licensed under open source licenses, such as PHP, Perl, or Python, code written in those languages can still be subject to copyright protection.

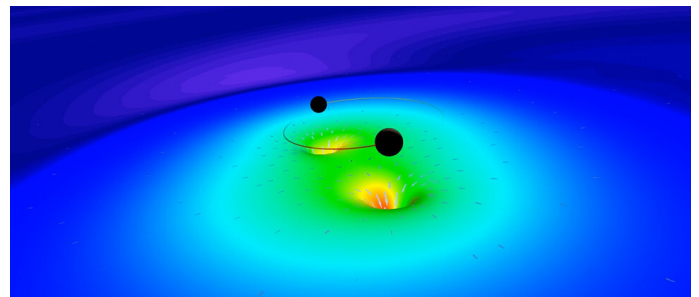


IMAGE 11: Computer simulation shows the warping of space and time around two colliding black holes observed by LIGO on September 14, 2015.

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IMAGES

IMAGE 1: Visualization of the halos in the Outer Rim simulation at redshift.

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IMAGE 2: NASA's Chandra X-ray observatory celebrates its 20th anniversary.

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IMAGE 3: "Pulsar in a box" simulation tracks electrons (blue) and positrons (red) as they interact with magnetic and electric fields around a neutron star.

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IMAGE 4: Part of the "first light" science image from the Transiting Exoplanet Survey Satellite (TESS).

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IMAGE 6: Simulation of collision between two exoplanets.

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IMAGE 7: The Large Synoptic Survey Telescope (LSST) will take the deepest, widest image of the Universe.

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IMAGE 8: Map of the Milky Way from Gaia DR2 compiles the fluxes measured in the Gaia G, GBP and GRP photometric bands.

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IMAGES

IMAGE 9: Our sun captured by NASA's Solar Dynamic Observatory

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IMAGE 10: Double star system and surrounding disc.

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IMAGE 11: Computer simulation shows the warping of space and time around two colliding black holes observed by LIGO on September 14, 2015.

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