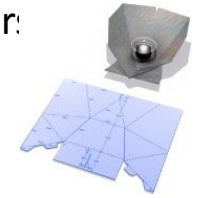
Solar Oven Evacuated Tube design

The evacuated tube style solar cookers are somewhat new on the market and in the solar cooking world, though they have been used for solar cooking by tinkerers and inventors for a few short years they have not been largely available to the commercial market until now.

The older style box (ovens) cooker



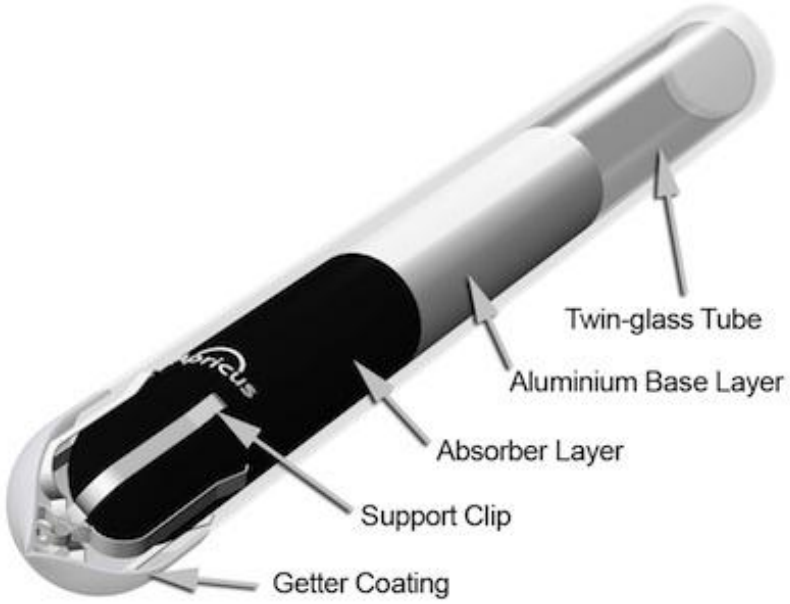
panel cookers

and parabolic cookers

have been around for much longer, some as long as fifty years, but now there is a new and very effective method of solar cooking in the form of the compact and very fast evacuated tube solar cookers.

Strong Glass

- The tubes are made from a type of glass called Borosilicate, the same base material as used in many Pyrex glass products used in kitchens around the world. Borosilicate glass has the characteristic of being very strong and also has excellent light transparency (>92% @ 2mm thick) .
- The wall thickness of the glass greatly impacts the strength, longevity and naturally also the cost.



Efficiency

- The combination of the highly efficient absorber coating and the vacuum insulation means that the coating can be well over 200°C / 392°F and the outer glass is cool to touch. In strong sunlight, each evacuated tube can provide over 60 Watts / 204 Btu of water heating output.

Vacuum Insulation

- The name "evacuated" is used to describe the process that expels the air from within the space between the glass tubes, forming a vacuum. A vacuum is an excellent insulator against heat loss, and so evacuated tubes are able to operate very efficiently.

Evacuated Tube Design

- The **GoSun Stove shown here** is a unique solar cooker in its design and in its capacity to cook very fast.
- The evacuated tube design has an advantage in that it holds and retains its heat better than any other style of solar cooker, and it will heat up quite well even in less than optimum conditions.
- The sun and moon resort in china uses evac tubes to cook for its restaurant. (now that is big time!)
- This solar oven tube allows you to cook anything that you can cook in a conventional oven. The inside and outside tube are nice clean Pyrex type glass with no coatings on it. This makes cleanup a breeze. It can be washed normally. If you are cooking a roast, you can use either an elongated tray or aluminum foil to hold the meat and allow you to slide it in and out. If you are boiling water, just pour it in and put it in the Sun! The same goes for soups, stews, etc. You can cook right on the inside of the tube. You can cover the open end while in use with anything that is not flammable below 400-600 degrees Fahrenheit. Cooking temperatures regularly reach up to 250 degrees without reflectors, or if you add a reflector, temperatures can reach 400-600 degrees!

Water boils at 212 oF

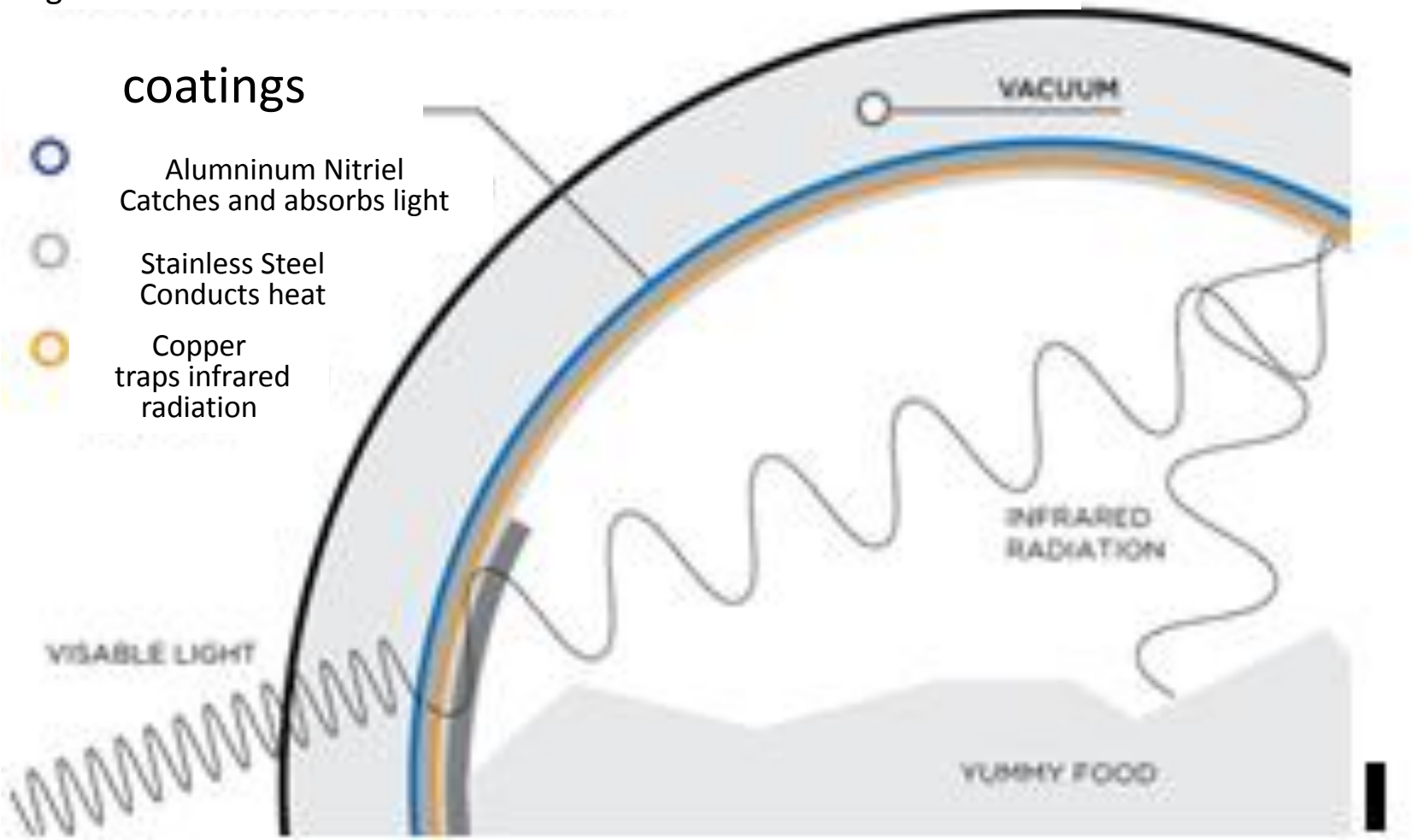
All cooking options for your tube solar cooker

Since it is made of glass, it will last virtually forever if it isn't chipped or other wise broken.

Rand Evacuated tube diagram

Outer Space in a Tube

at the heart of the evacuated glass tube its not only a superior absorber of light but a fantastic insulator



Tracking the sun to increase efficient heating.

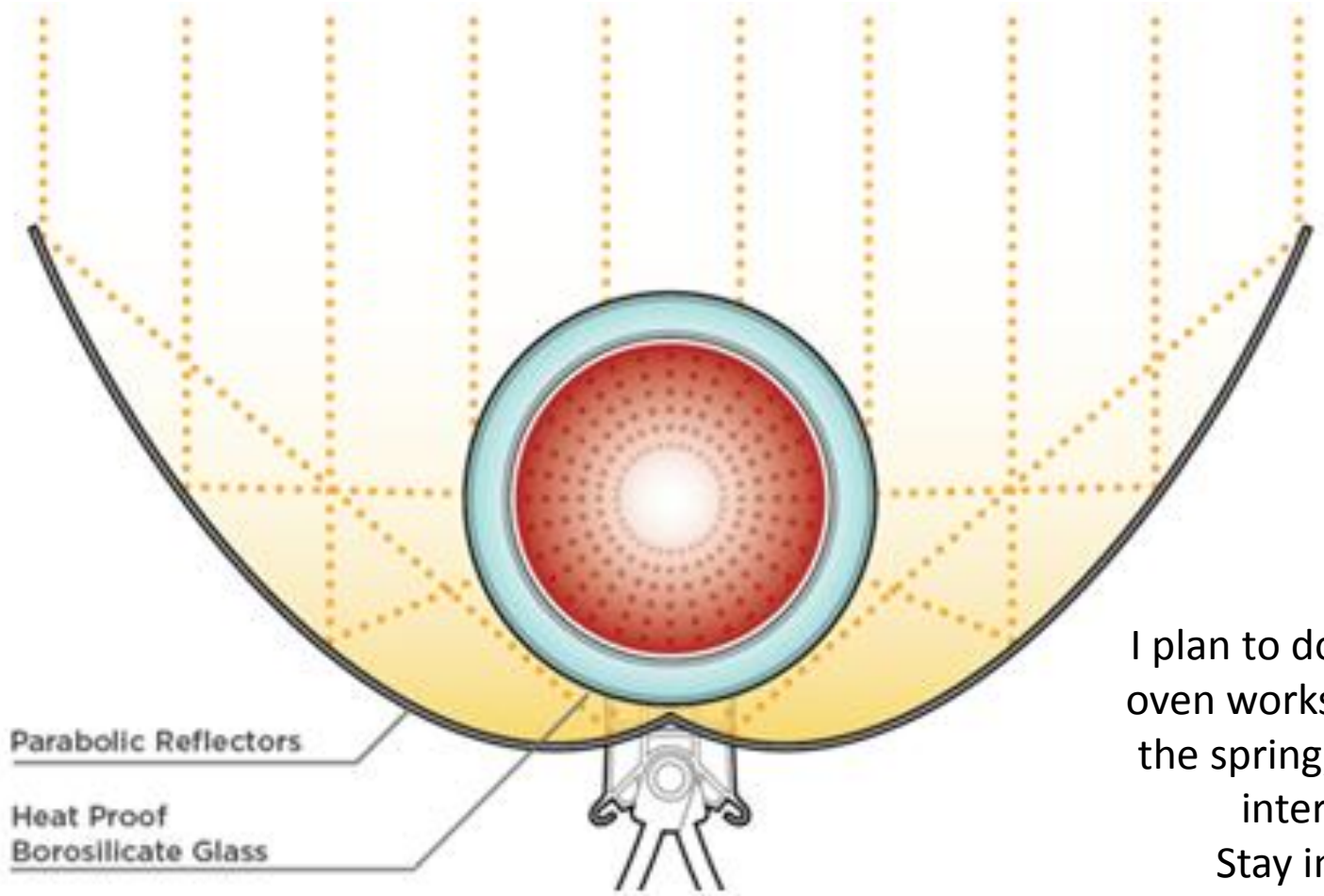
A reflector system is Optional since tube will cook in the sun without any added reflector targeting

Note the sun ray tracking patterns.

See how the Use of reflector material can target sun rays for cooking the food inside the tube.

Parabolic concept

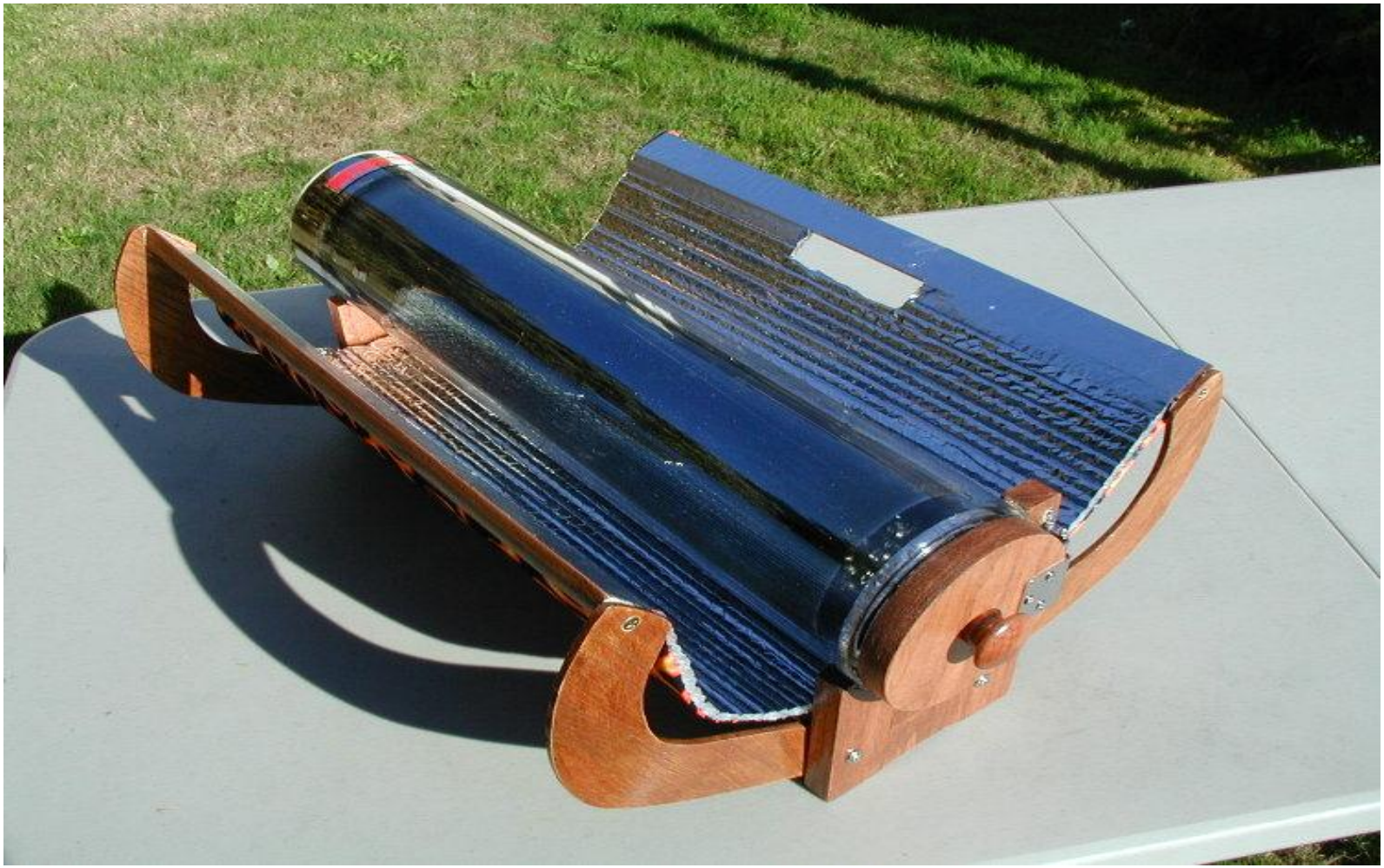
there is plenty of parabola math principles to search online, if you are interested in delving deeper into design.



I plan to do a parabolic oven workshop build in the spring, for anyone interested.
Stay in touch.

Wooden frame idea

articulating arms



wood frame

drawer pull glide for tray. arms together in storage position, reflector removed.

wood box idea

could repurpose an old drawer or make it new

wood frame idea brightly Painted

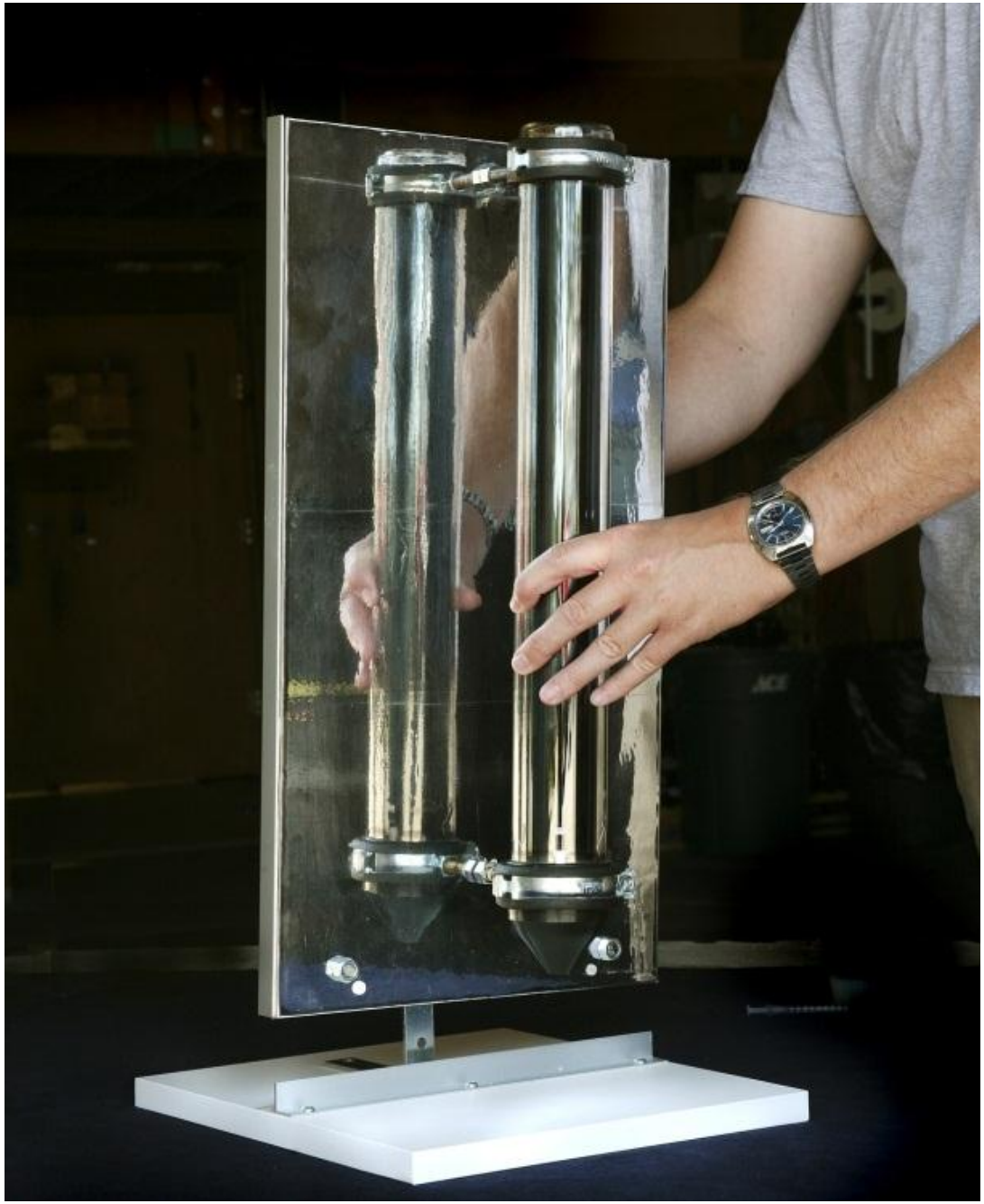
tray pull / lid combination.

Separate arms allow for targeting options

Reflector exterior spiffed up stylin'!

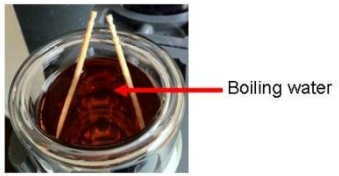
Mounted to tripod armature for multiple angle capability

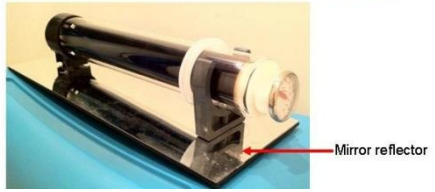
Wood or other composite material idea



Mounted flat panel idea

Could be used vertical or horizontal

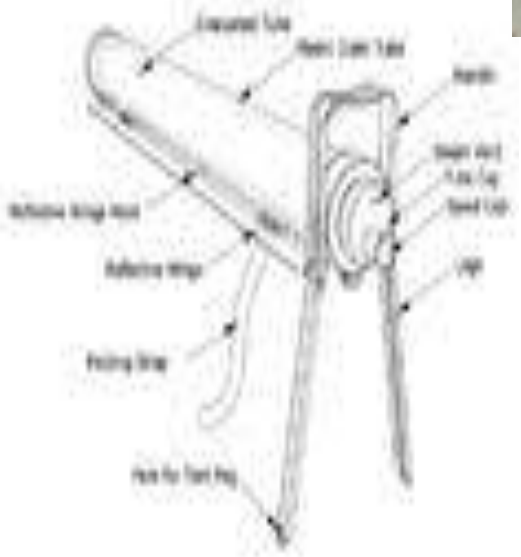




Horizontal platform view

Aluminum frame
or could be covered wood

Metal or wire support idea



Steel housing idea

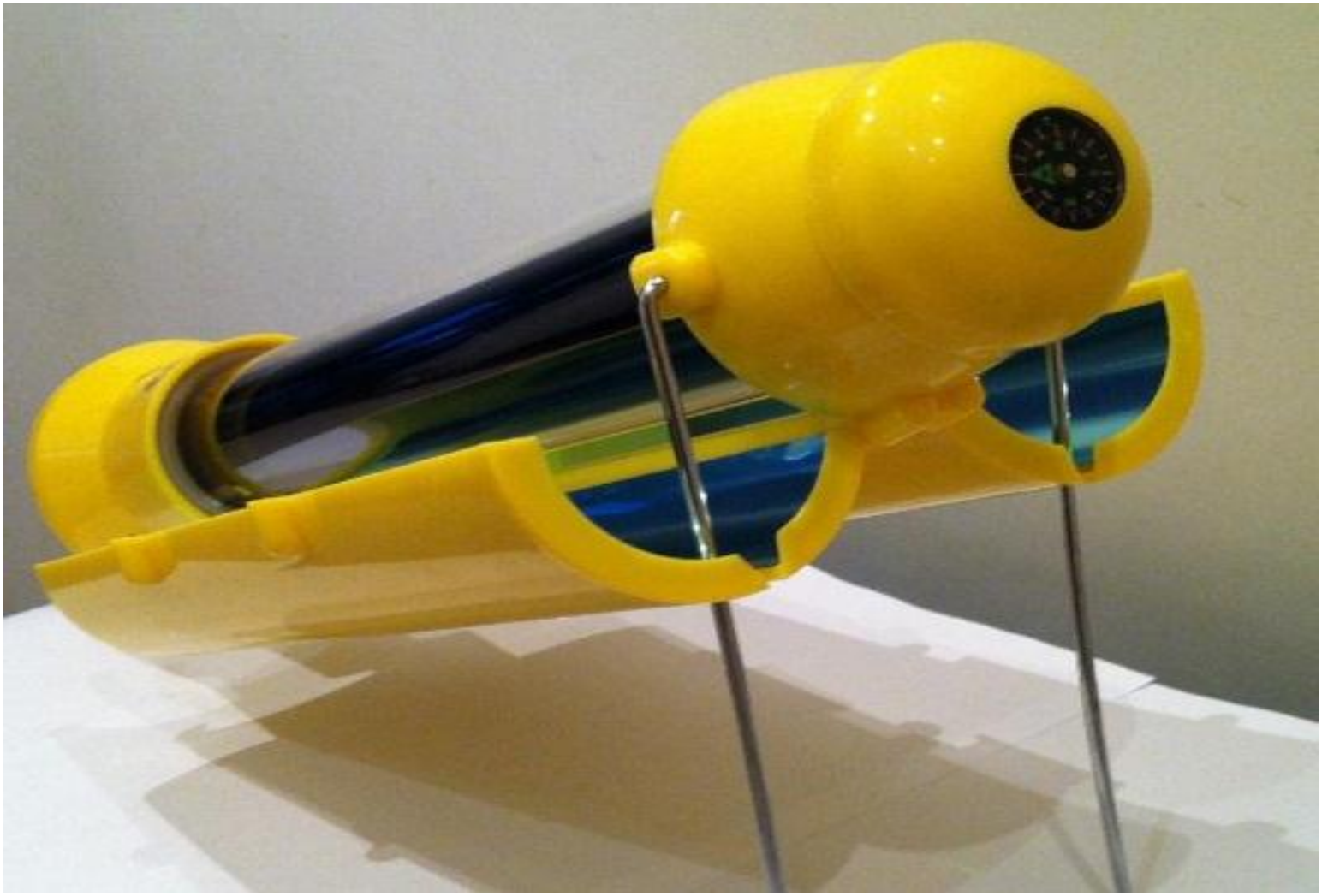
could be a repurposed mail box cutout

Tray ideas

separate cooking dish or wire mesh tray
it doesn't have to be rounded or even solid to function.

Plastic case support idea

anybody into designing a plastic 3D print program?



Suitcase concept

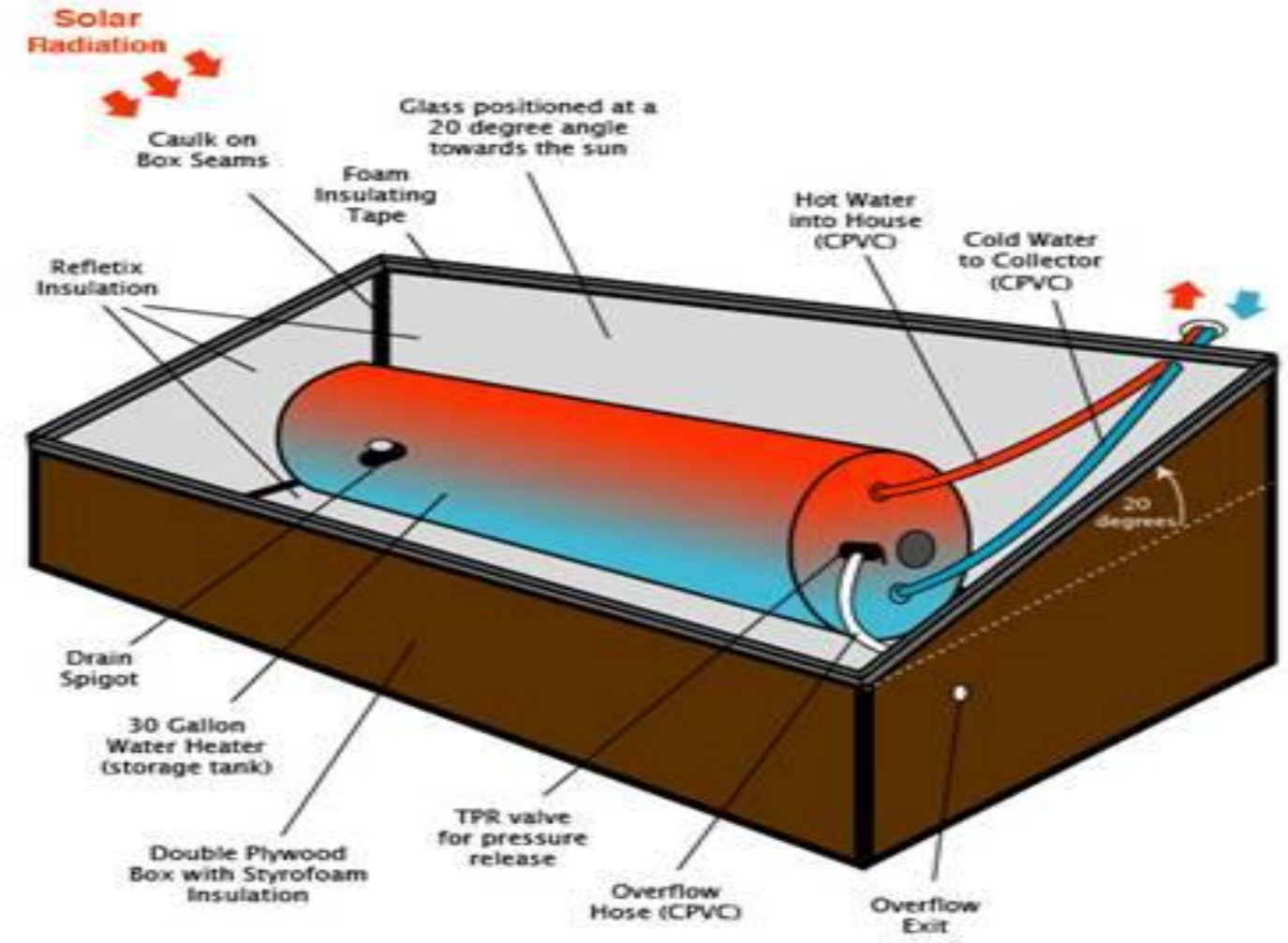
could be adapted using a recycled suitcase

More suit case idea

Another case idea

Concept to use box with tube

Don’t worry about the water supply, this picture just showed the idea fairly well.



Car window shade reflector idea

Instead of using a tray, food is wrapped in foil to cook inside tube

reflector duo use idea

As shown here with the pots functioning as box cooker style. Multi purpose with room to do both at once!

Go sun mini wood frame concept

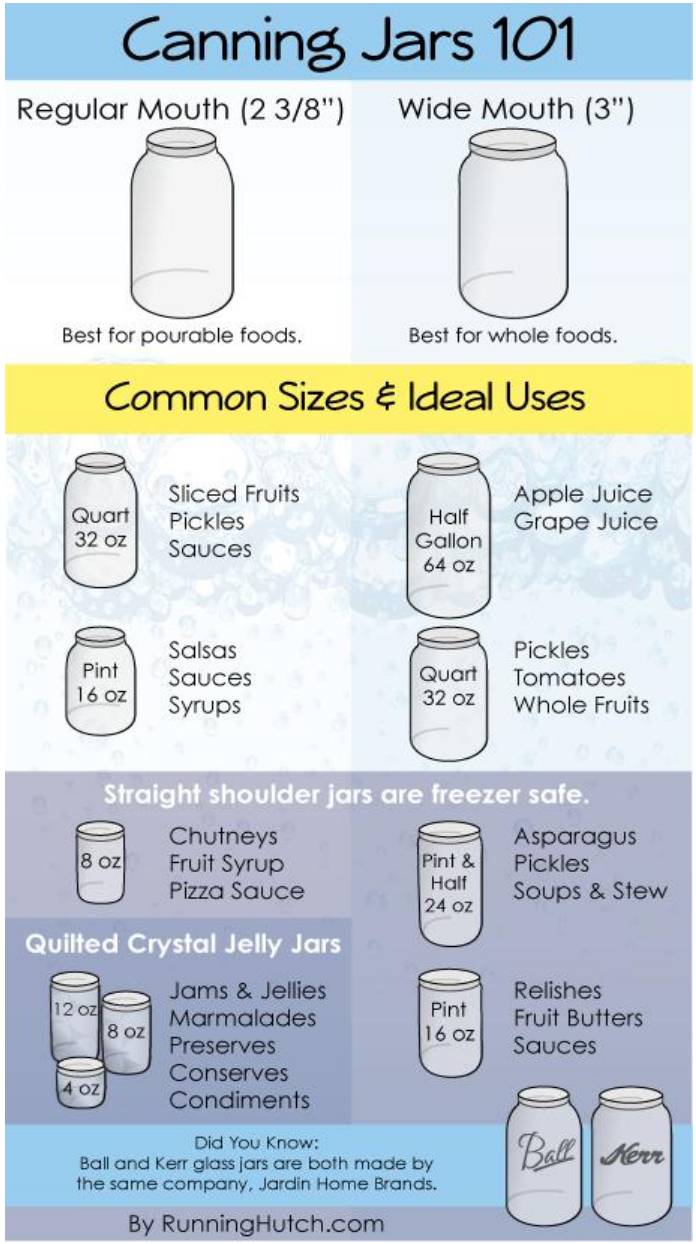
A home made tube style system

For the super budget minded.

This one works on sun heat more than uv radiation, and of course, will not get as hot.

To be on the safe side, only use tempered jars designed to withstand high heat. Canning jars or used jars that have been through a heat pasteurization cycle like ones from soup, pasta sauce, vegetables and the like.

Also be sure jars have no chips that can cause cracking.



Scoop on jars

and lookie here, a solar lid to have a hanging jar light. Found on amazon
Go solar!

And a fermenting lid. How clever! Does anybody brew their own beer?
Ok back to our regularly scheduled program!

Auto-rotation and Battery cell for night cooking concept

For those over achievers that don't have enough to challenge them already.

https://www.youtube.com/watch?v=hPXjzsXJ1Y0
Liter of light

Well what are you waiting for…

Lets get to designing your custom tube cooking system!

Take a tour of xerocraft hacker space and see what you have at your disposal.