

# Re: Centrifuge on the moon and mars

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On 10 May, 15:52, Willie.Moo...@xxxxxxxx wrote:

Space colonies have been seriously proposed as far back as the 1970s by engineers and scientists like Gerard O'Neill

[http://en.wikipedia.org/wiki/Gerard\\_K.\\_O'Neill](http://en.wikipedia.org/wiki/Gerard_K._O'Neill)

who built large vacuum chambers for particle accelerators. And in fiction as far back as the 1920s – by John Bernal

[http://en.wikipedia.org/wiki/J.\\_D.\\_Bernal](http://en.wikipedia.org/wiki/J._D._Bernal)

Nearly all these space colonies rotate on their axes to produce a form of artificial gravity through centrifuge action

<http://en.wikipedia.org/wiki/Centrifuge>

And this has been proposed in space to produce artificial gravity for interplanetary trips. Either by tethering spacecraft together and causing them to spin around their common center

[http://en.wikipedia.org/wiki/Gemini\\_11](http://en.wikipedia.org/wiki/Gemini_11)

Or by building a small rotating cabin within the vehicle, as depicted in some science fiction movies

<http://upload.wikimedia.org/wikipedia/en/2/22/2001-centerfuge.jpg>

Well, what about the use of a centrifuge on the surface of a low-gravity planet to produce 'earth normal' gravity?

At 1/6th gee, adding another 5/6th gee with a centrifuge is possible. Or on mars bringing 1/3 gee up to a full gee with a centtrifuge is possible as well.

So, why not do it? Why confine cnetrifuge to zero gee use only?

Imagine a transparent spherical pressure vessel 250 m in diameter on the surface of the moon. The sphere sunk into the ground 50 m. At

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ground level there is ring 200 m in diameter. This is a maglev type system, that supports a cylindrical wall 150 m tall, and attaches to another 200 m diameter ring in the sphere above. The cylindrical wall is made to rotate at 110 kph. Anyone standing on the interior of the rotating cylinder will feel 1 gee of force pointing 9 degrees from vertical. It will feel to them as if they're on a gently sloping surface. Constructing floors and buildings at this slight angle – in steps – would create a 1 gee environment.

At the base of the moving wall there is lip set at 9 degrees from vertical. Inside this lip is a set of concentric cone segments forming concentric set of rings – also supported and driven by magnetic forces – that move slightly slower than the wall and each ring moves slightly slower than the ring before it. These are about 1 meter wide and change their angle relative to vertical so that at the speed they're operating a person standing on the ring feels gravity pulling them normal to the surface of the ring. A person standing on the floor of the dome can easily walk across these moving slidewalks increasing their speed from zero to 110 kph, and into the one gee field.

In the design I have prepared there is a conical vaned structure forming a ceiling over the rotating cylinder, that rotates along with it. This structure allows light into the interior while managing air flow and noise. In this way those moving on the centrifuge surface feel only a gentle continuous breeze not a gale force wind! The center of the dome is depressed below the 'access ring' and a low gravity fountain is the central feature of the dome's low gee interior. This keeps the air moistened and clean and controls odors.

The fountain shoots up to the top of the dome over 220 m above the fountain level and hits the vanes. These act like fans and disperse the water into five well defined 'water falls' on the 'upper' end of the centrifuge. The water noise provides a pleasant backdrop to the operation of the rest of the machinery. The 100 m water falls hit the centrifuge forming a 'ring river' on the upper section. This ring river is suitable for swimming. The river drains into five separate channels along the length of the cylinder interior. The channels drain out of the 'bottom' falling below the lower lip, and are ejected out to a catchment around the outside of the base.

Access to the dome is through a ramp running underneath the cylinder at the fountain level – through an airlock to the outside, or to another pressurized space. Water in the catchment is returned to the fountain by five return channels – along the sides of the access ramps underneath –

The 200 m low gee section surrounding the fountain (3.1 hectares) is built up commercially.

The 150 m by 628 m area (9.43 hectares) is mostly residential with

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some commercial space.

Up to this sort of scale it seems possible, though it might still be too small to provide 1g without nausea. 2rpm is above the current "safe design" limit for nausea, though of course we don't know till we do some useful experiments (likewise the need for this – maybe humans can breed in 0.38g).

Given that, the design seems more complex than a freefall colony and is only possible because you build in a 9 degree "non-rising slope". This would be a curious feature.

On Mars, given the presence of Phobos and Deimos, I'd say why bother – why not just build a cylinder around Deimos and if you get pregnant of out of shape (I admit the former is unlikely) you just go and spend a year in cylinder (or torus).

IIRC Larry Niven called this confinement.

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