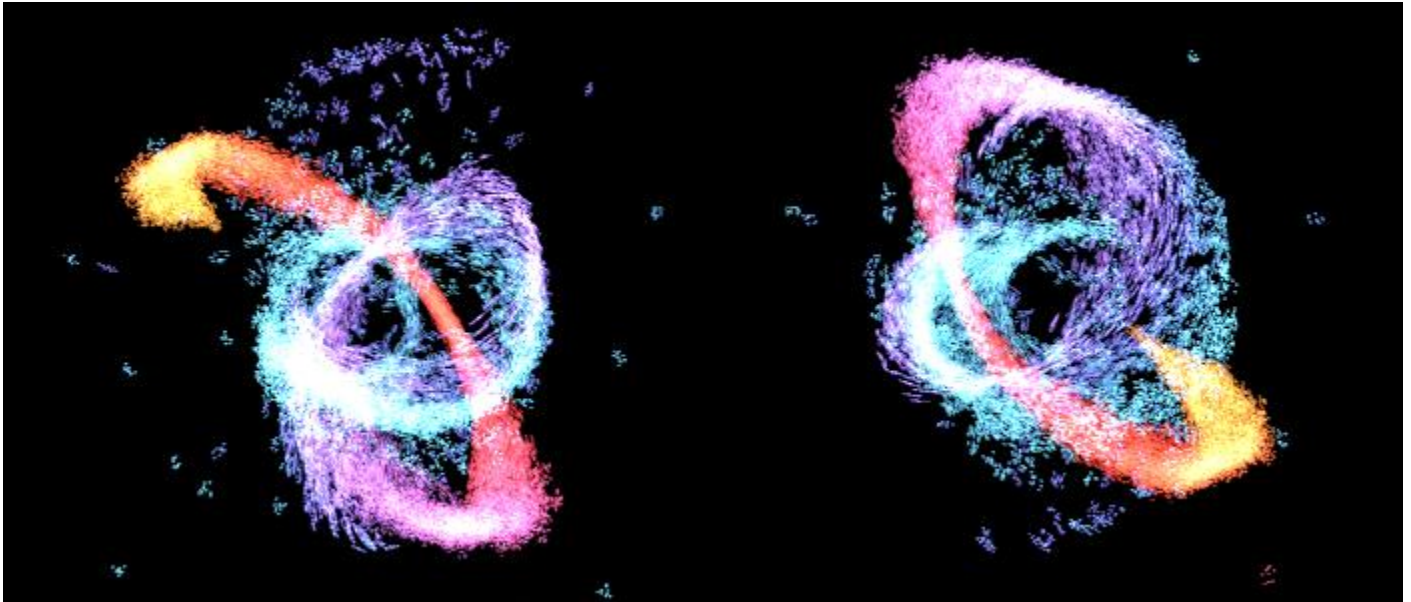


Particle Forces

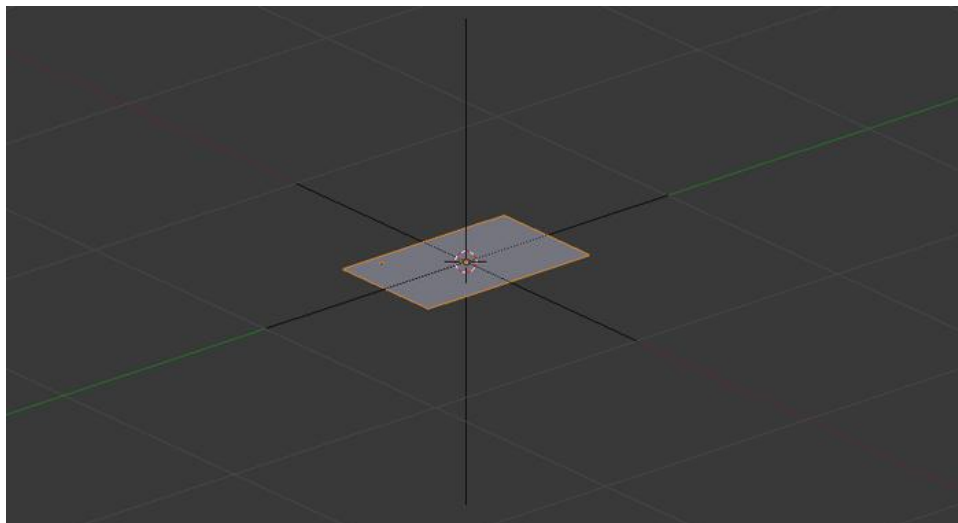
Dark Scarab Tutorials -- Blender 2.5



In general, it seems the particle system in Blender is used mainly for grass or a really basic floating or falling particles effect. However, force fields can be quite powerful in drastically turning the typical boring falling particles into well controlled or even vaguely directed particles that go where you want them to go. This tutorial will only use two types of force fields in recreating [the animation](#) that spawned the image above. However, once you create one force field you can easily test all of the other types of forces to see exactly what they do.

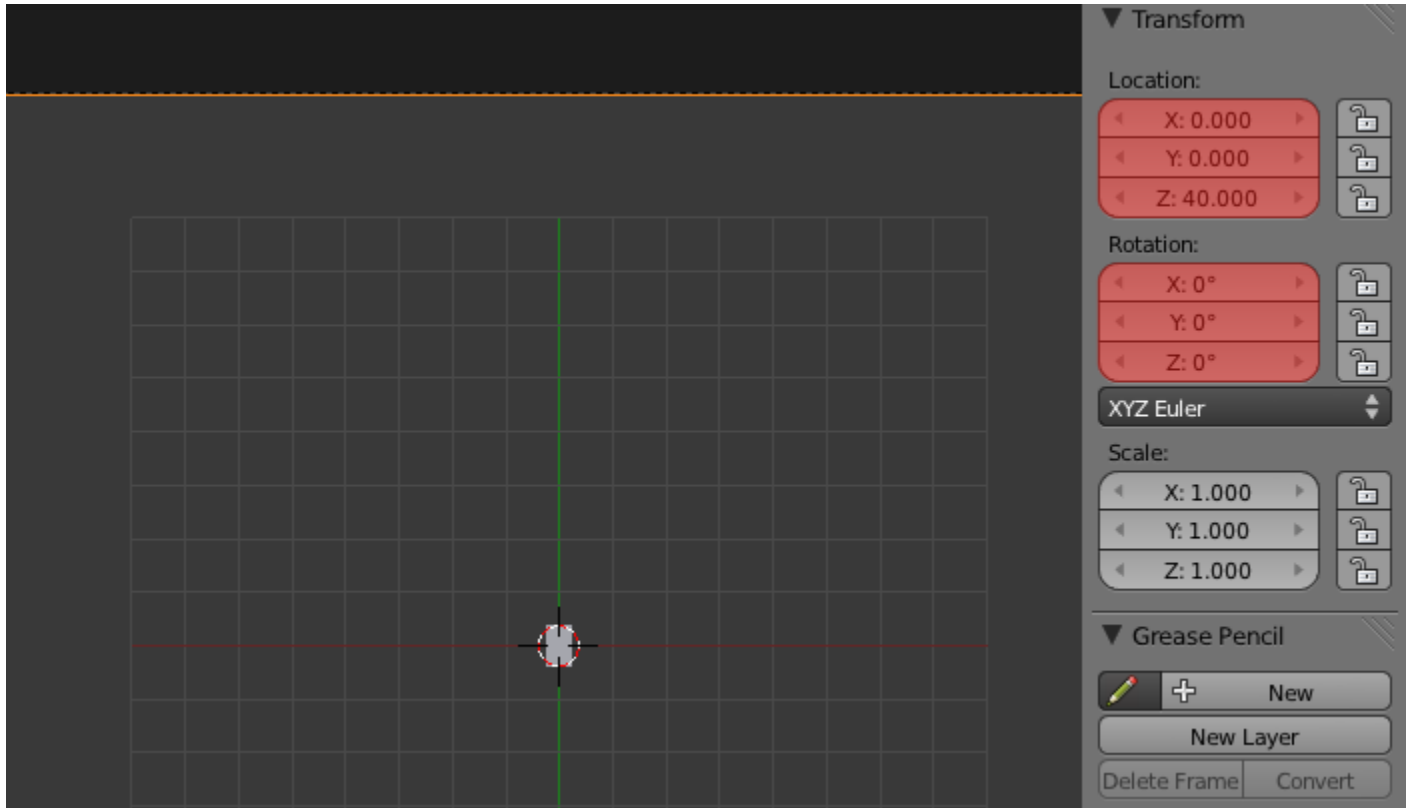
The Setup

The first thing we have to do is set up all the components of our scene. If you have the default cube, delete it, as we will not be using it in this tutorial. In its place, add a plane (Shift-A→Mesh→Plane). Scale it along the X axis by a factor of .250 (Press S, X, 0.25) and along the Y axis by a factor of .4 (Press S, Y, 0.4). This is going to act as our emitter, which we will come back to later. Next, we want to add an empty (Shift-A→Empty). Both the plane and the empty should be centered at the origin.



There are also going to be two other empties in our scene that will be exactly the same except for their position in the scene. Because of this, we will make one now and then duplicate it when we have added the force field to it later on in the tutorial. For now, select our empty that is already in the scene duplicate it (Shift-D) and move it along the X-axis by 8 units.

That next object we need to set up is the camera. With the camera selected, open up the **Transform Panel** by pressing 'N', if it isn't open already. Then change the X, Y, and Z values under **Location** to *0.000*, *0.000*, and *40.000*. Then change the X, Y, and Z values under **Rotation** to *0*, *0*, and *0*. This puts the camera into a top down view. Lastly, down in the timeline menu, change **End** to *400*.



Adding Particles

Let's add a particle system into our scene now. Since our plane is going to be the emitter, select the plane and go to the **Particles** settings. Once there, add a new particle system to the plane by clicking on the button with the plus sign on it.

The first batch of settings we are going to change are in the **Emission** section. To recreate the video, we want quite a large number of particles which emit until partway through the video and live throughout nearly the whole video. With that in mind, we will change **Amount** to *15000*, **End** to *150*, and **Lifetime** to *250*.

Other settings to change include changing the **Normal** setting in the **Velocity** section to *0.000*, turning on the **Emitter** setting in the **Render** section, and changing the **Gravity** setting in the **Field Weights** section to *0.000*.



If you play the animation at this point (Alt-A) then you should see the particles appear on the plane and do absolutely nothing. This is exactly what should be happening since we have turned of gravity and we have change the Normal initial velocity to zero.

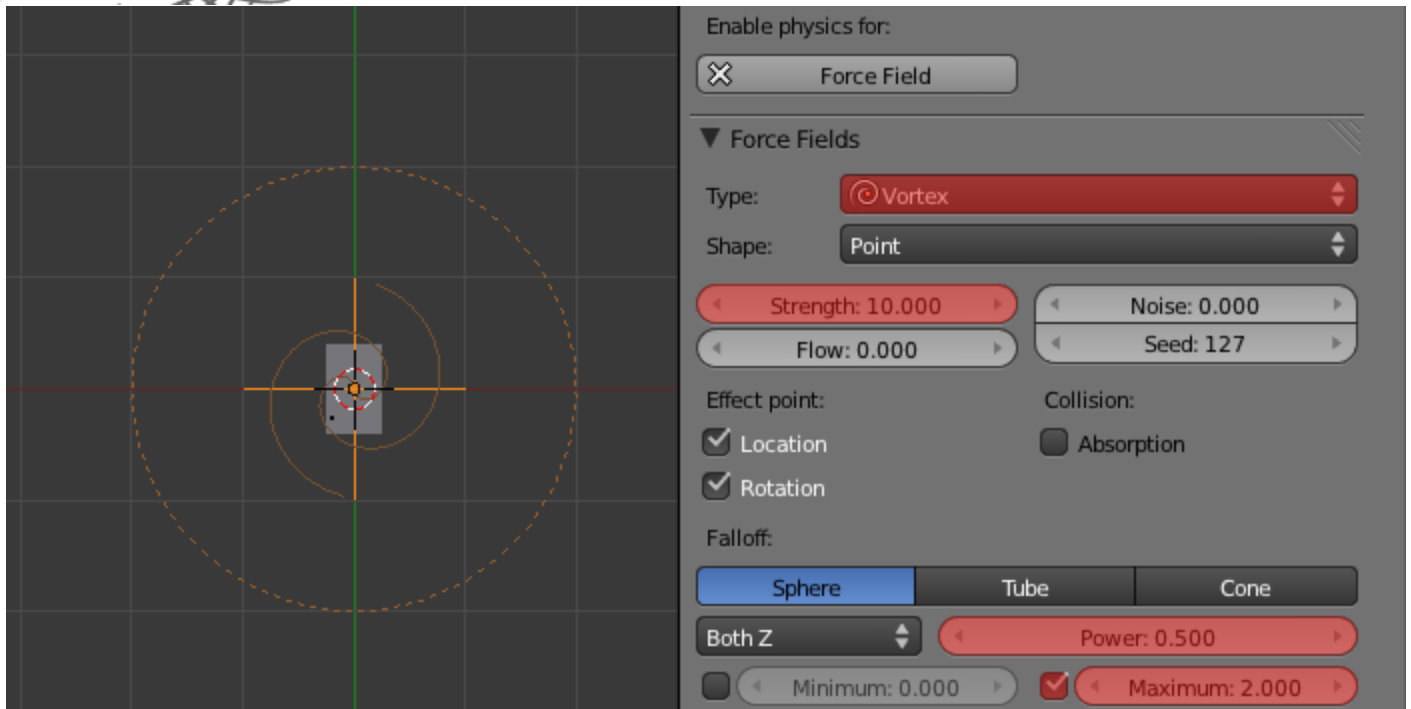
The Force Fields

Now we have gotten to the fun part! To start, let's put a force field on the empty that is in the same spot as our emitter. Select that empty and in the **Properties** panel go to the **Physics settings**. There should only be one button labeled **Force Field**. Click on that and you should see an array of settings you can use. By default the force field will be set to the most basic force, however, we are going to change the **Type** from *Force* to *Vortex*.

The first setting to change is the **Strength** setting, which you will want to change to *10.000*. If you play the animation (Alt-A) now just to see what it does before change the next setting. You should see the particle move in a circular motion and outward, with the particles going faster as they move further away from the vortex.

However, since we do not want this force field to affect the particles everywhere in our scene, we are going to turn on **Maximum** by checking the box next to the setting and change the value to *2.000*. In the 3D viewing window, you should see a dashed circle going around our vortex force field showing the area that it affects. Again, if you want to see how this changes it, play the animation again.

Lastly, we are going to change **Power** to *0.500*. This setting changes how strongly the force field effects particle depending on how far away from the center of the force the particle is. The higher the value, the less strongly the field works at the edges of its maximum boundary.

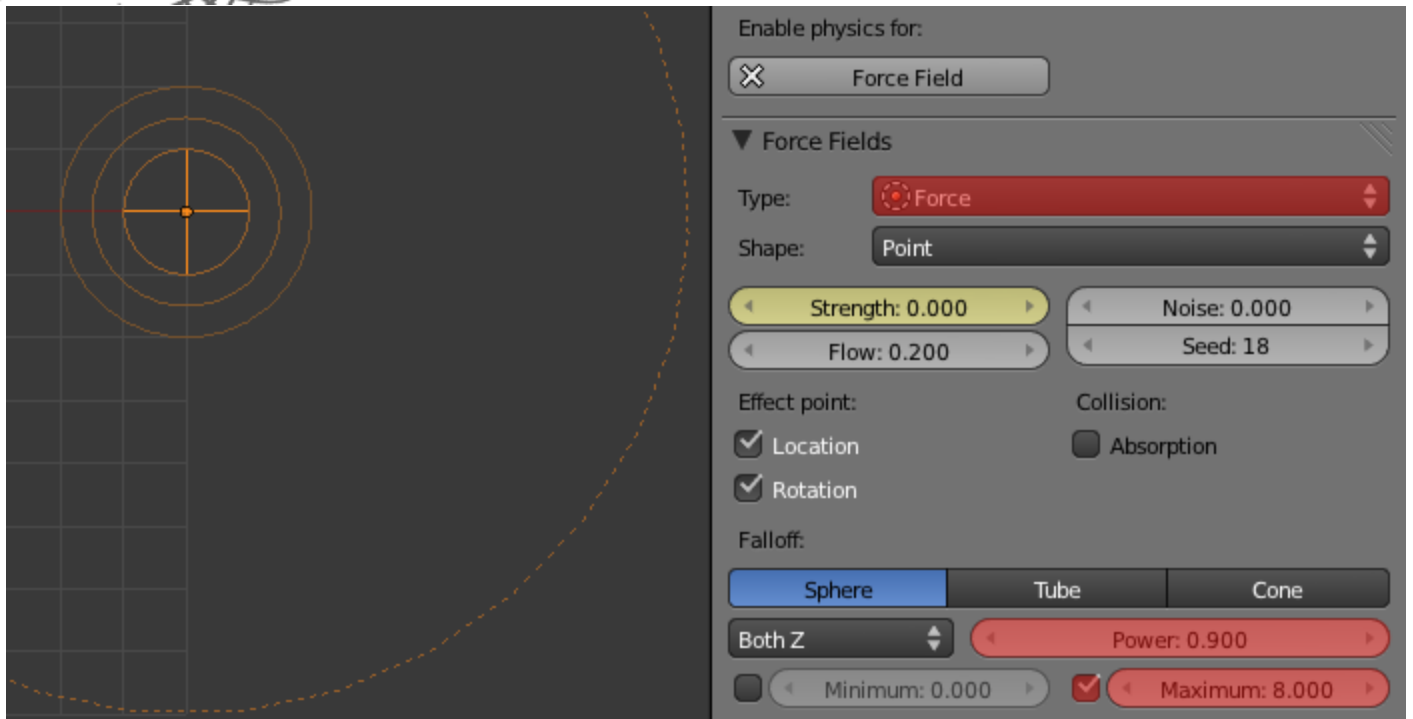


Side Note: If you've never used forces, this is a pretty good time to test out the other kinds of forces that are available to get an idea of what they all do. While exploring, keep in mind some forces may require something else to get it started. For instance, the magnetic force doesn't do much without some initial velocity on the particles and the Charge force won't work unless you give the particles themselves an initial charge (this can be done in the **Force Field Settings** section in the particles panel. Make **Type1 Charge** and particles will be given that charge).

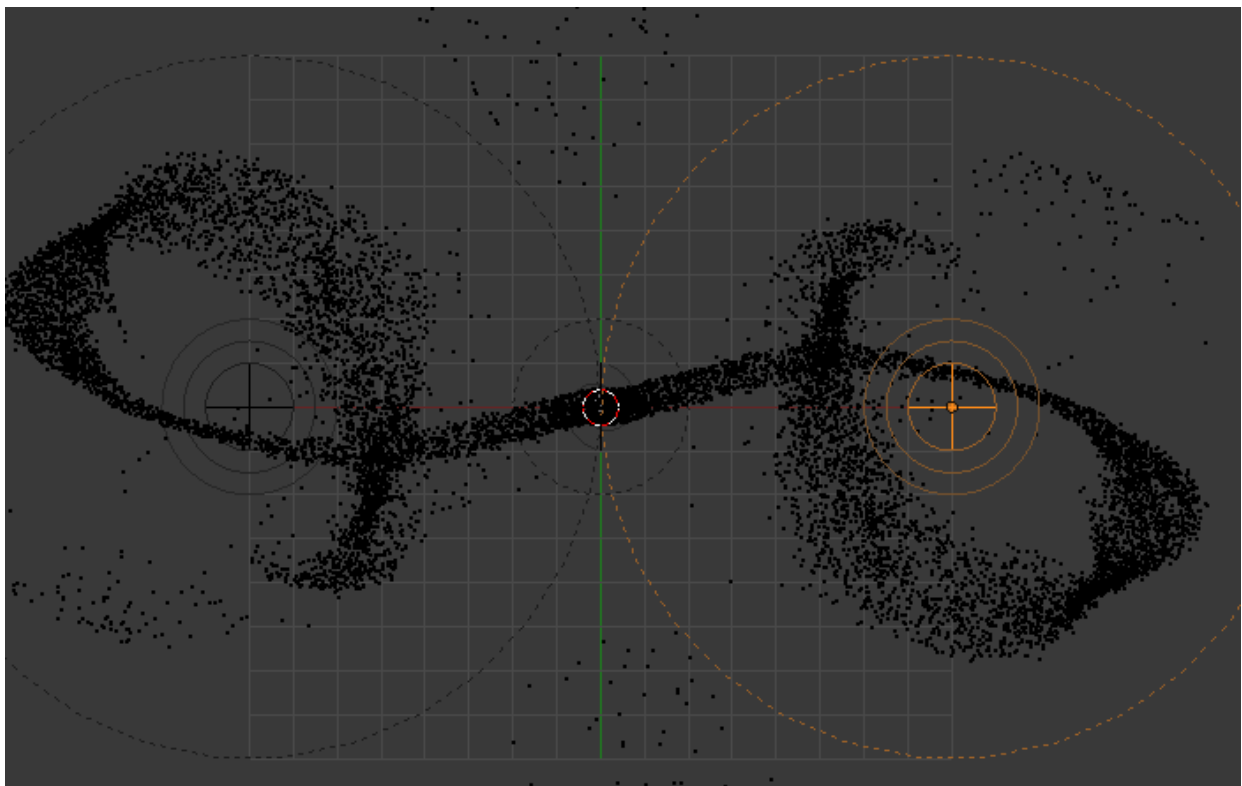
The other type of force we are going to be using is just going to be the basic force field. Select the empty that is off to the side of the emitter, go to the **Physics** section and click on the **Force Field** button. Similar to the vortex force, we want to set the maximum distance that the Force field is going to work. In this case, we turn on **Maximum** and change it to **8.000**. Also, change **Power** to **0.900**. With the maximum distance on this force field and the other force field (which we are going to make in just a little bit) we will actually pull one group of particles into two.

Adding even more force fields could even result in many groups. Without the maximum value turned on, having many force fields with the same strength would cause a group of particles to move to where the forces are equal and cause the particles to sit in one spot.

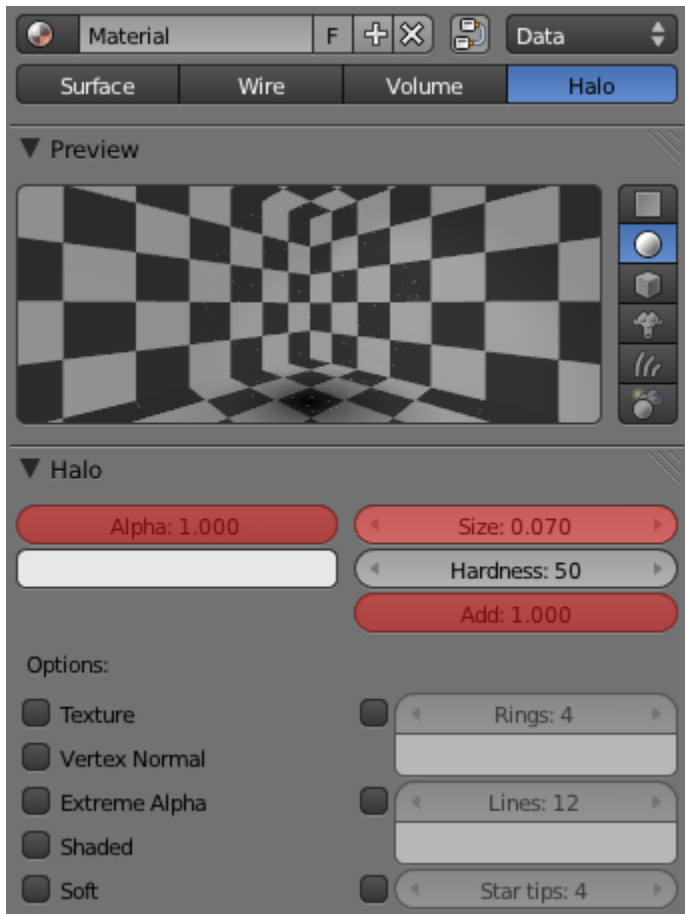
Unlike the vortex force, we are going to animate the strength of this force field. To start, make sure we are on frame **1** in the timeline and make sure the **Strength** of the force field is at **0.000**. Then right click on the **Strength** setting and choose **Insert Keyframe**. Now move to frame **90** in the timeline and change the **Strength** setting to **-50.000**. Insert another keyframe by right click on the Strength setting again. Finally, move to frame **100**, change the **Strength** setting to **-100.000** and add a new keyframe.



If you remember, we still need one more force in our scene, but because it is exactly the same as the one we just created, we do not have to add a new empty. Instead, we duplicate (Shift-D) the force field we just made move it along the X-Axis by -16. This puts it on the opposite side of the vortex force and the edges of the two force fields touch right in the middle. Playing the animation now should give us the final particle movement that we are looking for.

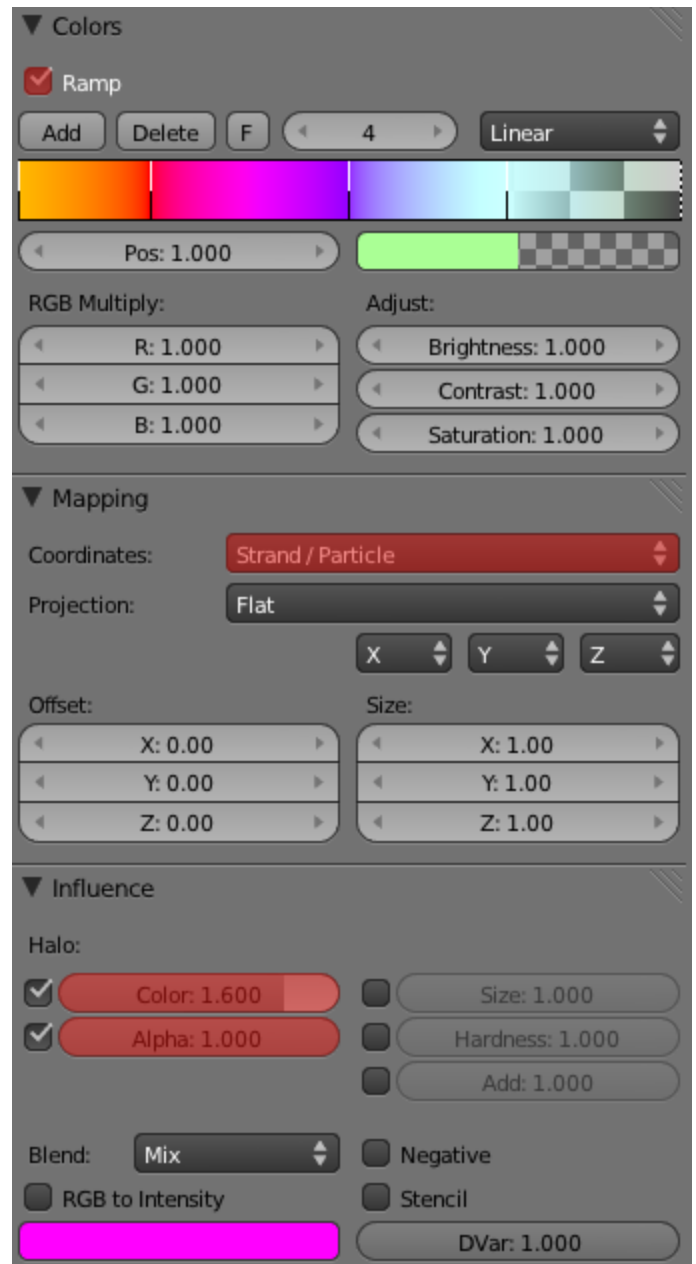


Colors!



Rendering with the current set up will get us some pretty ugly results. To fix this we can start by changing the material of the emitter. Select the emitter and go to the **Materials** settings in the **Properties** panel. Click on *New* to create a new material for our particles. Then change the materials type to *Halo* so we can tweak the way the particles look better.

The material itself is pretty simple. We are only going to change **Alpha** to *0.000*, **Size** to *0.070* and **Add** to *1.000*. The particle will look very tiny in the preview, but since there are so many of them in our scene, we will have no problem seeing them in the render. Add also brightens up the particles so that we can see them more easily.



As I am sure you noticed, the colors of the particles change as time goes on in the video. A simple blend texture is what it takes to get the nice color changing effect to our particles. So make sure that the emitter is selected and go to the **Texture** settings. Click on the *New* button and change the **Type** of the texture to *Blend*. In the **Colors** section we want to turn on *Ramp*. This is where our colors are going to come from. The first color will be on the left and the last color is going to be on the right end of the gradient. Feel free to use whatever colors you like. Also, keep in mind that you can choose color values that are greater than 1. Sometimes this will give you a stronger more saturated color than with just a value of 1. For instance, the red in my gradient is RGB(1.650, 0, 0).

To get the blend texture to actually effect the particle in terms of how old the particle is we have to go into the **Mapping** section. In here, change the **Coordinates** to *Strand/Particle*. This effects all of the

particles in the same way as time goes on rather than certain particles depending on where their emission point was on the emitter. We also want to go into the **Influence** section. Make sure both the **Color** and the **Alpha** settings are on and change the **Color** value to *1.600*.

Rendering now will give us the right color and the right motion, however, as you may notice it is quite sparse. There are plenty of ways to remedy this, such as adding even more particles, making the particles bigger in the materials section, or we can add children particles. I wanted small particles in my video, so I went with adding children. Adding 10 children to each particle doesn't slow down the calculation of the particles much, especially compared to having 10 times the amount of particles in your scene.



To add children we need to select our emitter again and go to the particles settings. There should be a section that is called **Children** somewhere in there with three buttons to choose from. Click on *Simple*. A whole slew of settings should appear. We are just going to change **Render** to *10*, **Radius** to *0.300*, and **Roundness** to *1.000*. This will give us 10 times as many particles in our render without the extra time to calculate the particles. Admittedly, stray particle will make it look a little clumpy, but when they are packed together you can't tell the difference.

That's all for now! Go ahead and render an animation of your controlled particles!