

# Particles 3+

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## Credits

Original code: PoseWorks

Poser Pro 2014 rewrite: Snarlygribbly

Icon graphics: Biscuits

Chief tester and documentation: Wimvdb

Presets: Wimvdb

Many thanks also to all the testers, whose feedback was invaluable.

## Overview

Particles 3+ is a python script which you can use to create volumetric effects in Poser such as smoke, fire, bubbles, gun flashes and other effects. It will create a particles figure with individual elements which each have their own materials and which are animated according to the rules you have set for it.

Particles 3+ does not add new functionality compared to Particles 3 from PoserWorks. It has an updated User Interface and has been converted to run on Poser 9, Poser 10, Poser Pro 2012 and Poser Pro 2014 and Poser Game Dev .

Although the effect is achieved through animation, the results are perfect for stills as well.

The particles figure animation is started from the emitter prop. You place the emitter prop and give it a direction. You then set parameters in the particle figure which define properties like direction, size, rotation and speed and then start the simulation to create the effect.

The magic of Particles is the materials. These can be animated by means of a special node called PRT3\_Life. It allows the materials to change over time. There is also another special node called PRT3\_Random which can bring variation to each particle.

In addition to the Emitter and the Particles figure there is an Attractor prop. It is a special prop which can affect the particles stream. As the name suggests it can attract and deflect the direction of the particles.

## Basics

### Installation instructions

The script should preferably be installed in the Poser Python ScriptsMenu folder. Suggested location is <Poser Install folder>\Runtime\Python\PoserScripts\ScriptsMenu\Particles3+.

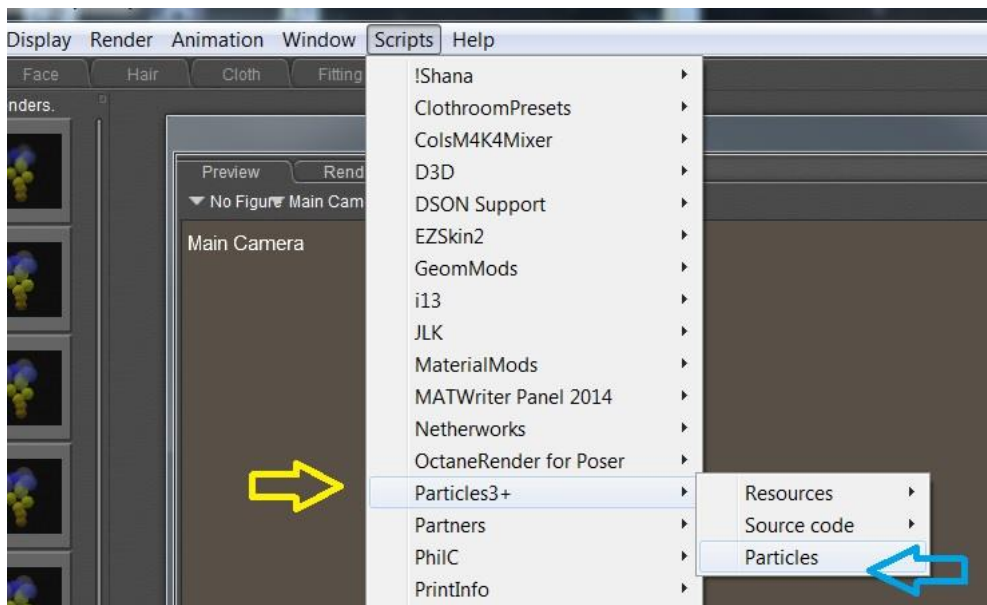
<Poser Install folder> is the folder where Poser is installed. For Poser Pro 2014 this is by default C:\Program Files\Smith Micro\Poser Pro 2014\.

The default particles are located in Runtime:Geometries:Particles3+ folder. The textures for the presets are in runtime:Textures:Particles3+. The presets are installed in the Runtime:Libraries:Scenes

The Particles 3+ script has been tested with Poser Pro 2012 and Poser Pro 2014 and should work with Poser 9 and Poser 10 as well. It will not work with earlier versions of Poser.

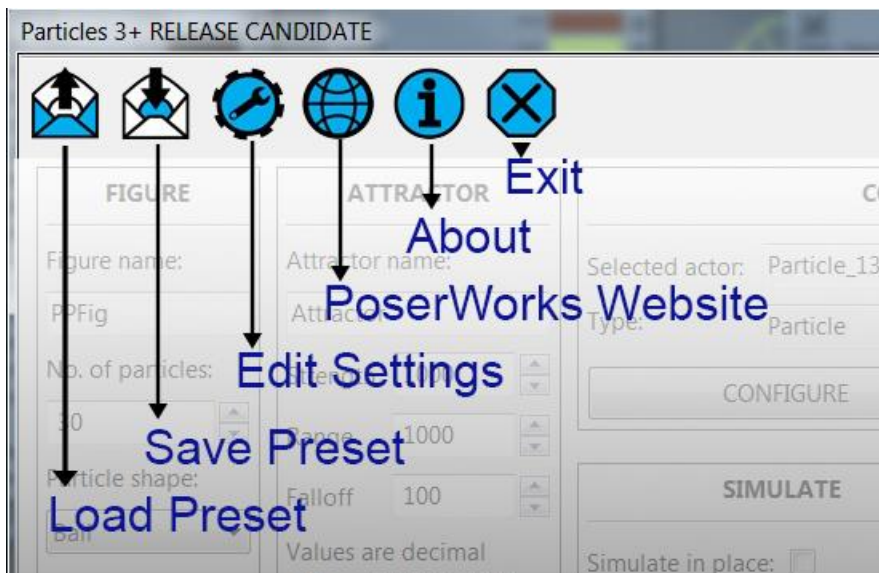
### Running the Particles 3+ script

You can start the script from the Scripts Menu – Scripts!Particles3+!Particles.



The script will open in the current room, but you can open new instances of the script in other rooms in Poser.

The script contains an icon menu where you can load and save presets, Set UI options, go to the PoseWorks website where you can find additional presets and tutorials, and Information box and the Exit Script button.

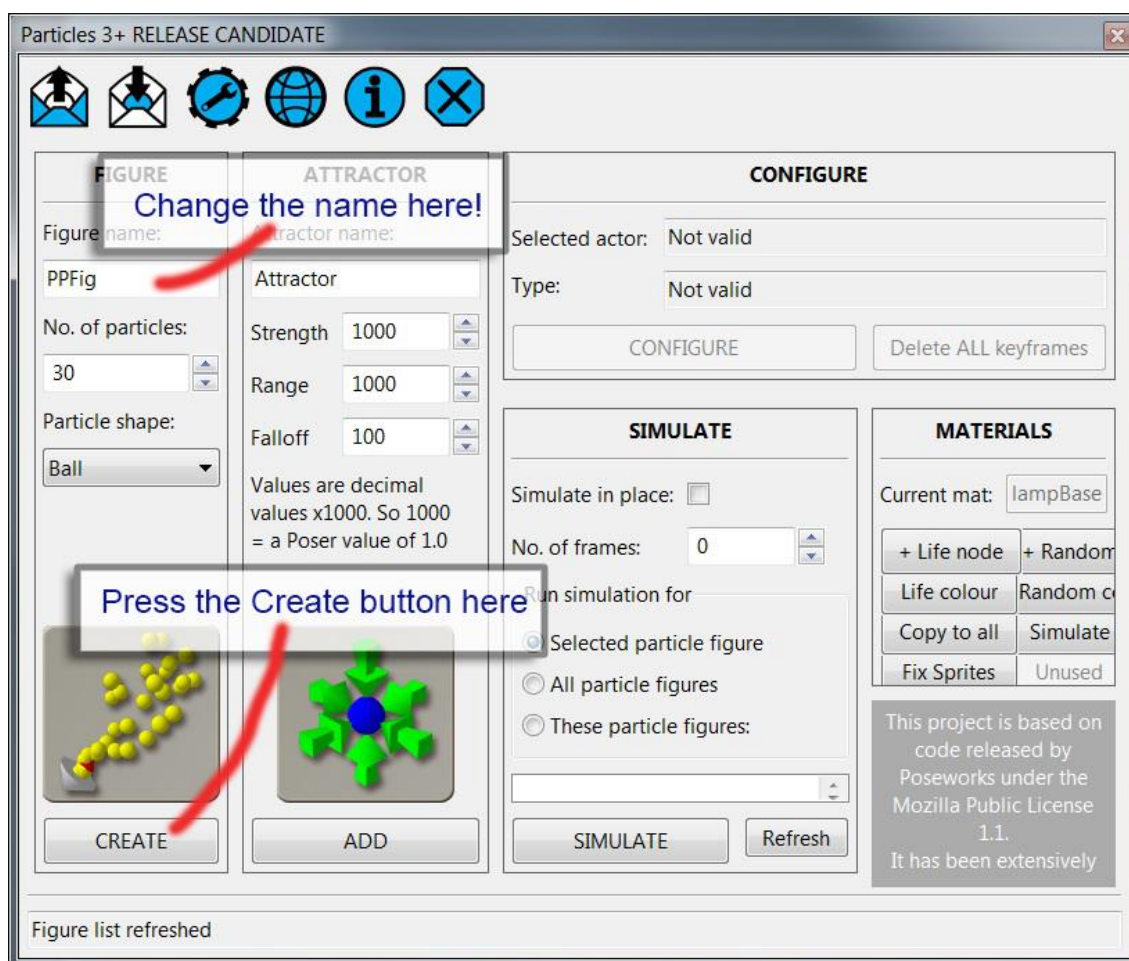


The other sections in the script window are the interface to the script which are explained in the following chapters.

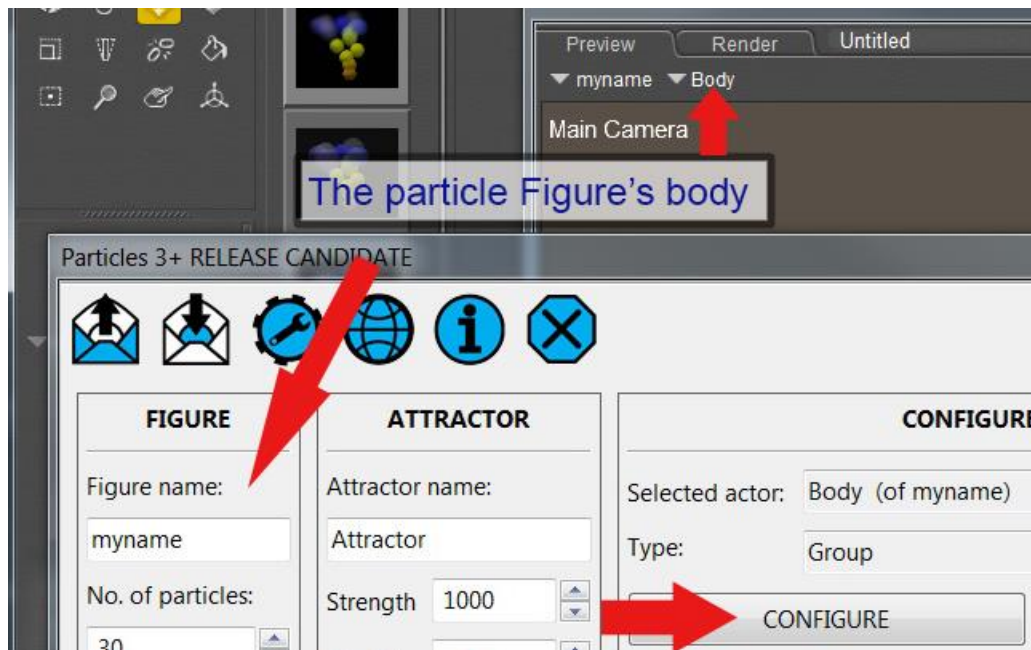
### Very simple walkthrough

To get things started let's do a very simple walkthrough of a particle simulation. This to get an initial feeling of how things work.

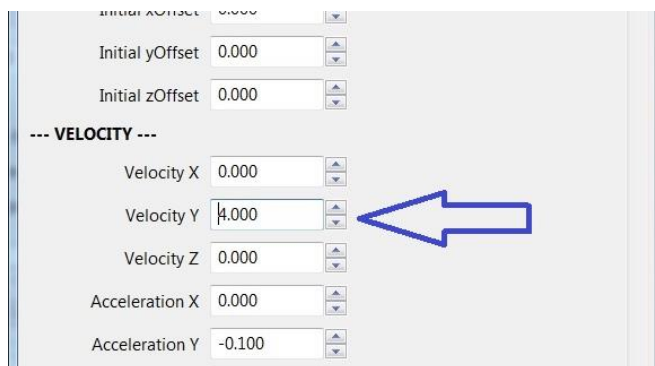
- Start the script from the menu
- Now create a Particle Figure: Give it a name, and keep the rest default (30 particles, ball) and press Create



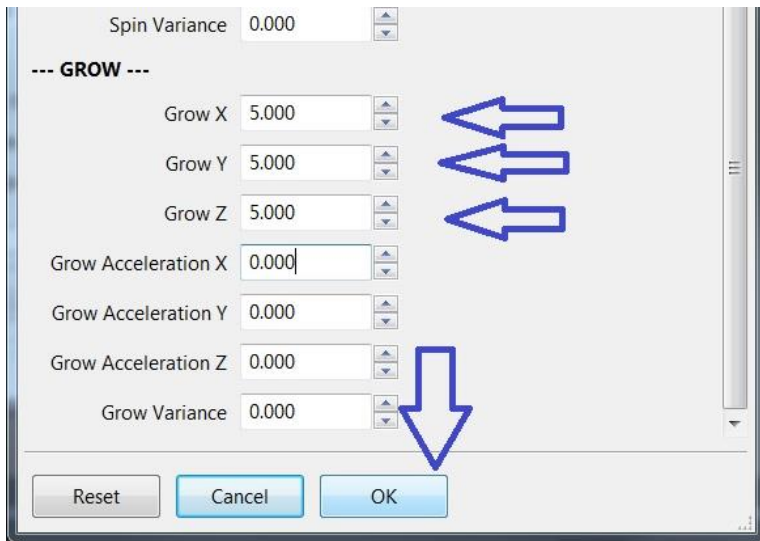
- Now we are going to configure it. The body of the Particles should be still selected, if not, select it



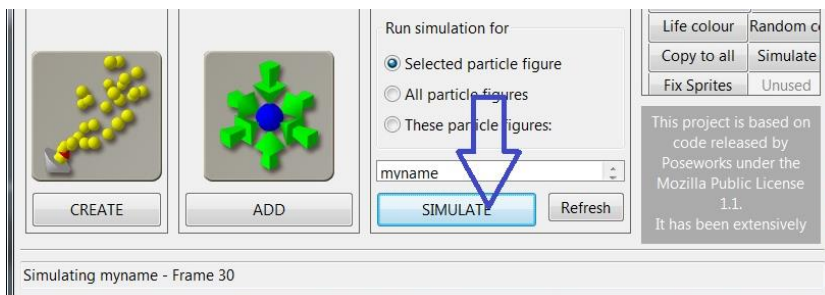
- Press Configure
- Resize the window to see more values
- Leave everything at default except the following:
- In the Velocity section set Velocity Y to 4  
this is the speed we are sending the particles up. The Acceleration Y is already set to slow down and the Gravity is set to 1 which will make the particles stop and go down again



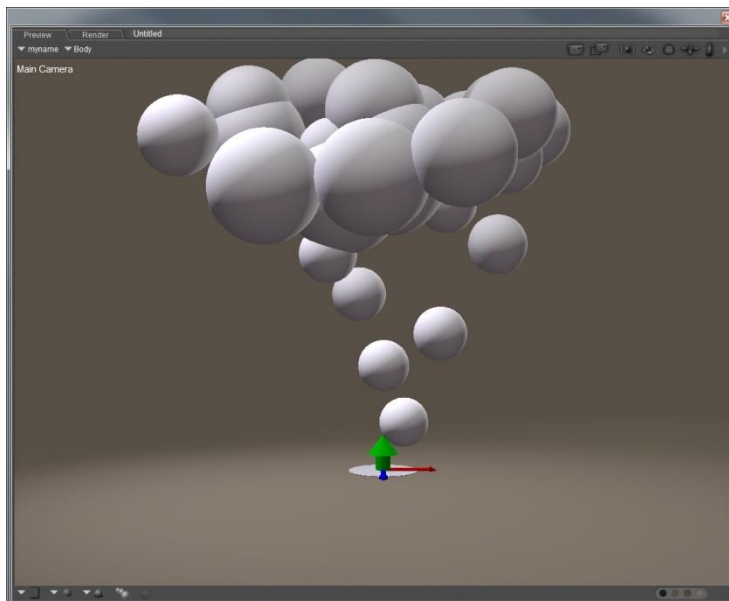
- In the grow section set Grow X, Y and Z to 5  
This will expand the particle in all directions over time



- Now we are finished – press OK
- The right Particle figure is already selected – so press Simulate



- And now you will have a nice set of bubbles going up and and about to fall down



Move forward and backward in the frames to see the animation.

In the next chapters all the elements are explained in more detail.

## Basics 2

First an explanation of what elements there are in the Particles 3+ script.

### Particles

The particles are the building blocks of the effect. They are created by the script, have a life span and will start a new life from the beginning after their time has expired. The particles can be of a different shape. Particles 3+ has a Ball, Torus, Pill, Sprite and a Cone and you can use your own custom object as well.

When creating the particles figure, you define its name and how many there should be in the figure. Be aware that the simulation will slow down if you add too many of them. Since the particles are re-used there is usually no need to have very many of them.

If you use a custom object you will be asked to locate it after you press the Create button. Be aware that the custom object is not UV mapped and has only the preview material available.

### Emitters

When you create a particle figure, an emission prop is created as well.

The Emitter is the origin for the animation. The direction and position of the Particle figure is defined here. The Emitter is linked to the Particle figure with a unique ID, so you can have multiple particle figures and emitters in the same scene. You can define the angle of the initial emission as follows: Select the emitter prop in Poser and press Configure. In it you will find a single parameter called Angle which you can change.

Be aware that if you delete the particle figure in Poser, the emitter is not deleted. So you have to do that separately.

### Configuration

In the Configure section you define the effect. Make sure the body of the Particle figure is selected and press the configure button. Each of the input fields has a popup which tells you what that value does.

The particle figure initially has a set of reasonable random values, so the configuration will be added or subtracted from these initial values.

### Delete ALL key frames

Delete All Key frames will delete all the key frames except frame no 1. If you make changes to the scene it is possible that a key frame has been set on the particle figure and the simulation will not function correctly because the values in the end frame have been set. This function will remove the key frame so the simulation will only take the values of frame 1.

### Particle Parameters

Unless otherwise specified all units are in Poser Native Units (1 PNU = 2.621m or 103.2 inches) or degrees.

### Rate of Emission

Rate of Emission defines how many particles will go out at the same time (frame). This will use up the particles, once the number of particles has been reached (as defined in the Create), it will no longer emit until new particles become available.

### **Recycle Particles**

Recycle Particles defines whether particles are being reused. If this option is checked, the particles which have expired will be re-used.

### **Life Span**

Life Span defines how many frames a particle will exist. After the time expires, it will be re-used if the recycle option has been checked.

Life Span has no direct relation to number of particles or to the number of animation frames. Each of them can be set individually. So you can have an animation of 100 frames with 50 particles with a lifespan of 20.

### **Gravity**

Gravity defines how much strength is applied for the particles to move towards the ground. If you want to have very light particles which float, reduce this value. You can also negate gravity completely by setting it at 0 or even push away by setting it to a negative value.

### **Transform**

The transform section defines the initial size, orientation and offset of the particles when they start. The Offsets define the radius of the particle emission and the Rotate values define the initial direction. The Scale value is the percentage of the particle objects default size.

### **Velocity**

Velocity is the speed at which particles will travel. In this section you define its initial velocity and how the velocity is affected over time. So a negative value in the acceleration will decrease the speed and a positive value will increase the speed over time. The variance value allows for a difference between each particle to give some randomness to the velocity.

The value is expressed in PNU's per second. Default Poser has 30 frames equaling 1 second, so a velocity of 1 will have the particle travel 1 PNU over the length of 30 frames.

### **Orbit**

Orbit defines the direction or angle which the particles will travel around a single axis and acts like a moon orbiting a planet. The Acceleration defines the progression or decline of the angle of the direction. Variance will randomize between the different particles.

The value is expressed as degrees per frame. So a value of 15 will orbit  $15 \times 30 = 450$  degrees around the central axis.

### **Spin**

Spin tells the script how each particle will turn around its own axis. This section defines the direction for each of them and the acceleration defines the progression or decline of it and the variance will add randomness.

The value is expressed as degrees per frame. So a value of 15 will orbit  $15 \times 30 = 450$  degrees around its own axis.

### **Grow**

Grow defines how particles will grow or shrink over time. Think of each particle expanding or contracting itself. This section defines how much progression or decline the growth will have and variance adds randomness for each particle.

The value is expressed as a percentage, so 2 means 2% growth.



## Materials

Materials are the key for Particles 3+. They define how the effect will look. The script has some useful tools to create the materials in the particle figure. It also has some special nodes which the script can interpret and use to animate the materials over time. In the Advanced Materials section I will go deeper into how the materials are created and applied and what effect they have.

The general procedure is as follows:

- Go to the material room
- Select a particle (any particle will do)
- Apply or create a material in the particles preview material zone.
- Use the Copy to All button to apply this material to all particles.

The special nodes are + Life node and + Random node. The + Life node adds a sequence number to each particle in each frame. This can be used in the material to generate materials which will change over time. The + Random node adds a random color to the material. You can use this to add randomness to the materials.

Before you begin, make sure you have a particle material selected.

The particle objects are not UV Mapped and have no textures, except the Sprites object which will be explained later. So you need to use procedural materials. Poser materials which are very useful are the Edge Blend, the Fresnel Blend, Color ramp, cloud and turbulence node. You can make your own materials or load existing ones from the Poser library.

### *+ Life Node*

This will add a PRT3\_Life node to the current material. It has a sequence number which increases with each emitted object. You can use it to age the material – such as making it fade away.

### *+ Random Node*

Here PRT3\_Random node is added to the material. It will contain a random color. You can use this in your material to avoid repetitions in your particle materials.

### *Live Colour*

Live Color will add a PRT3\_Life node to the material with a Color Ramp node attached. This combination can change the color of a particle over time.

### *Random Colour*

This will add a PRT3\_Random node attached to a color ramp. It will generate random colors in a give range.

### *Copy To All*

This function will copy the current material to all the particles. It will not however update the PRT3\_Live node with sequence numbers. Use Simulate to update these nodes.

### *Simulate*

Simulate is the function to update PRT3\_Life nodes with new sequence numbers. Use this if you have used the PRT3\_Life node in your material and have used the Copy to All function.

This function applies to the materials. Not to be confused by the Simulate button in the Simulate section.

### *Fix Sprites*

Fix Sprites is a special function. It will update the sprites to face towards the camera. The use of sprites will be explained in a later chapter.



## Particle Simulation

This is the section where it all happens. Pressing the Simulate button here takes all the values from the configure section and applies it to all particles. The number of simulated frames is the number of frames which are present in the scene (so the end number of the animation frame In Poser).

You can either select to simulate the current particle figure, all the particle figures or select one particular particle figure.

### Simulate in Place / No. of Frames

This is an option which you can set together with the number of frames to have a head start in the simulation. It will generate particles for the set number of frames, but will not emit them until the frames there after.

### Refresh

If you delete a particle figure in Posers, use the Refresh button to let the particles script re-identify which particle figures are available. If you delete a particle figure, make sure you delete the accompanying Emitter prop as well.

## Advanced Topics

### Attractor

Attractors are props which can attract or deflect particles. They kind of act like Poser magnets. The attractor has a strength value, a range (shown in preview as a shaded area) and a falloff.

The attractor can be moved around, animated and parented to other objects of figures. So you can let the particles bounce of a wall if you parent the attractor to the wall. You can also animate the attractor so the particles will follow a certain path.

After adding the attractor and positioning and configuring it, run the simulate to get the end result. The attractor itself will not render.

### Strength

Strength is a value which defines how much it pulls or pushes the particles. A negative value deflects the particles, so pushes them away. A positive value attracts them and with enough time and strength will pull them towards its center.

### Range

Range is the zone of influence. Particles inside the zone will be affected, particles outside will not.

### Falloff

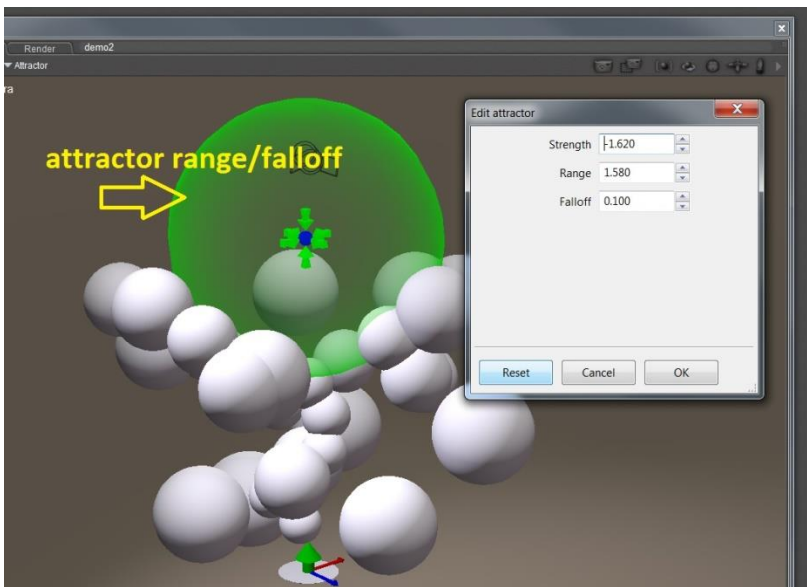
Falloff has to be a value between -1 and 1 (see below). It defines how strong the attraction is towards the center of the zone. With a value of 0, the strength is the maximum in the entire zone. With the Falloff at 0.95 the strength is very weak on the outside and very strong in the center. A value of 0.3 means the force gets gradually strong towards the center.

The value in the Particles main Window for Attractor Strength, range and Falloff is expressed as the real value x 1000. So entering a value of 300 for Falloff means an actual attraction Falloff of 0.3. The parameters in the configure window for the particle are the actual values – so 0.3 means 0.3.

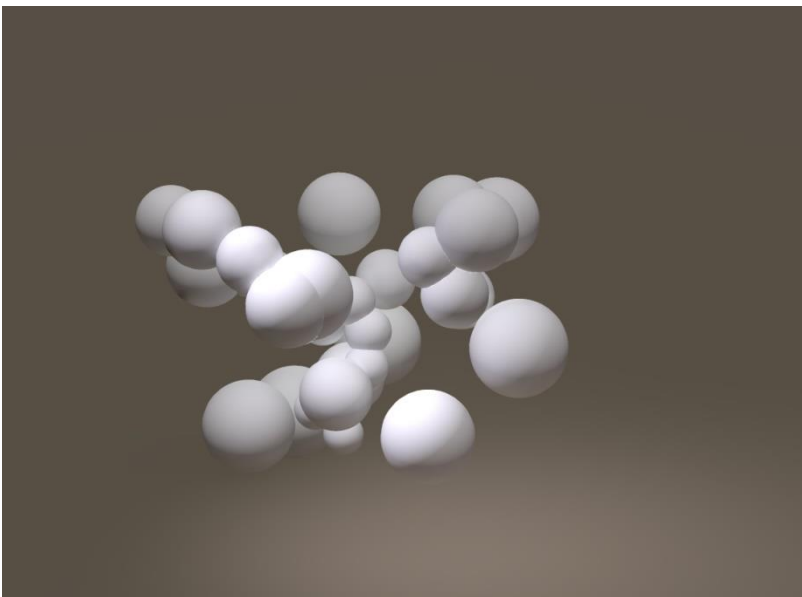
### Example

I have added here an attractor, set the strength to negative so it deflects the particle stream. I increased the range and put it in the middle of a particle stream.

Here a picture after simulation:



And here the result after rendering:



## Presets

Presets can be saved or loaded via the icons on the top of the Particles 3+ window

The preset save stores a special type of Pose file (pz2). It has the same format but adds the materials for the particles figure, its configuration parameters and the shape of the particles. So you need to load it via the preset load in the particles script and not via the library.

If you want to save a complete effect you need to save the scene as well. With saving the scene you keep the emitter and the attractor objects. Otherwise you have to save them separately.

The Weblink icon opens the PoseWorks site – you can find there additional presets made by PoseWorks.

The Particles 3+ package contains some additional user supplied scripts as well. It would be great if other users share their presets as well

## Advanced Materials

The materials for the particles are important to get a good effect. There are several firefly material which can help you achieve that. The Particles 3+ script adds 2 new nodes: PRT3\_Life and PRT3\_Random.

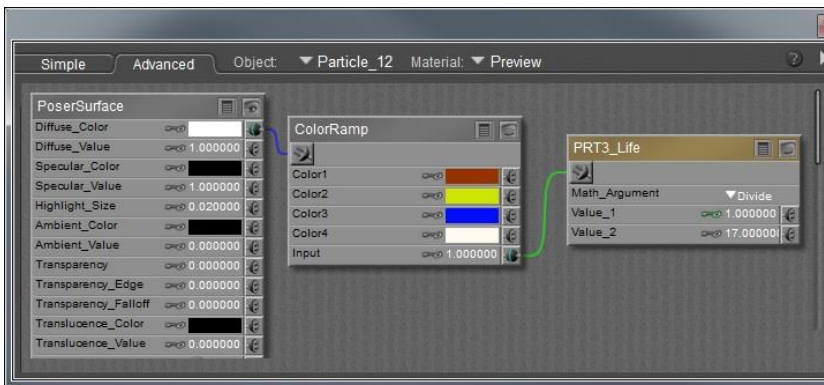
To use these nodes:

- Select a particle in the material room
- Add the new node via the script
- Do a Copy to All
- This will copy the special node to all particles.
- Do a Simulate from the material section in the script to generate the values for the new nodes.

### PRT3\_Life

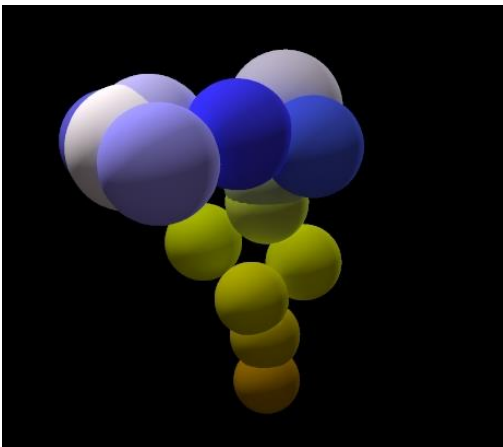
The PRT3\_Life node is a node in each particle whose value changes each frame it exists: from 0 in the first frame it appears to 1 in the last frame it exists. You can use this node to change the appearance of the particle over time. The LifeSpan value in the configuration of the particle defines how long it exists

Look at the following example:

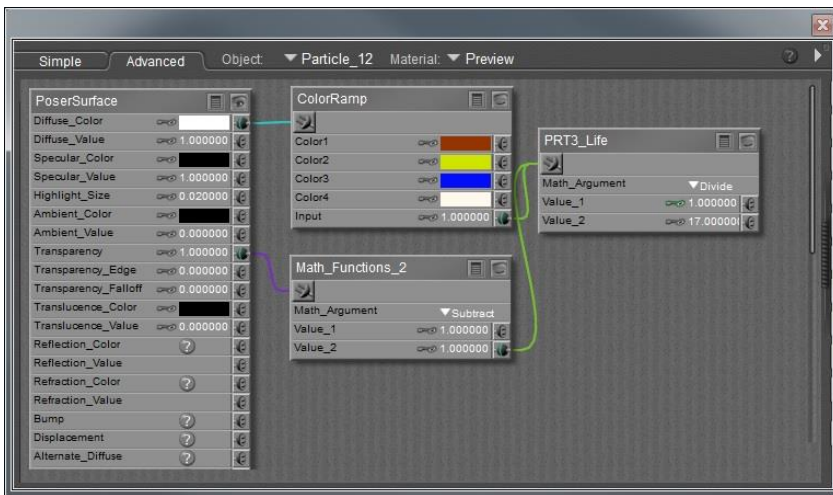


The lifespan of the particle is set at 17 frames from the particles configuration. The color ramp is used to cycle through a set of colors depending on the age of the particle driven by the PRT3\_Life node.

This is the result after rendering

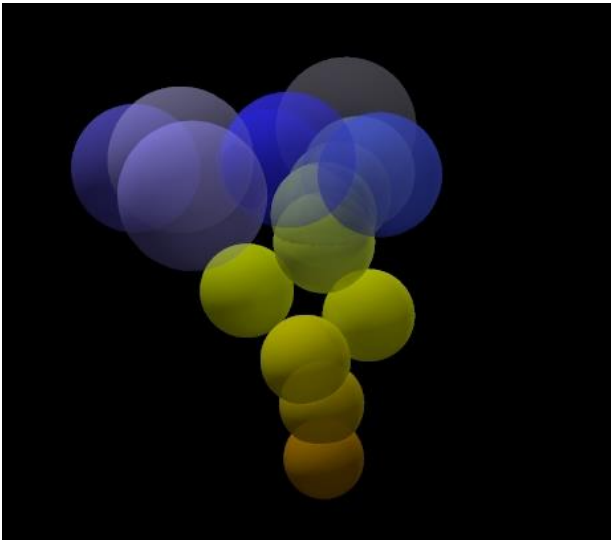


To make it more interesting, we can fade away the particles at the end of their life. We can do this by applying transparency

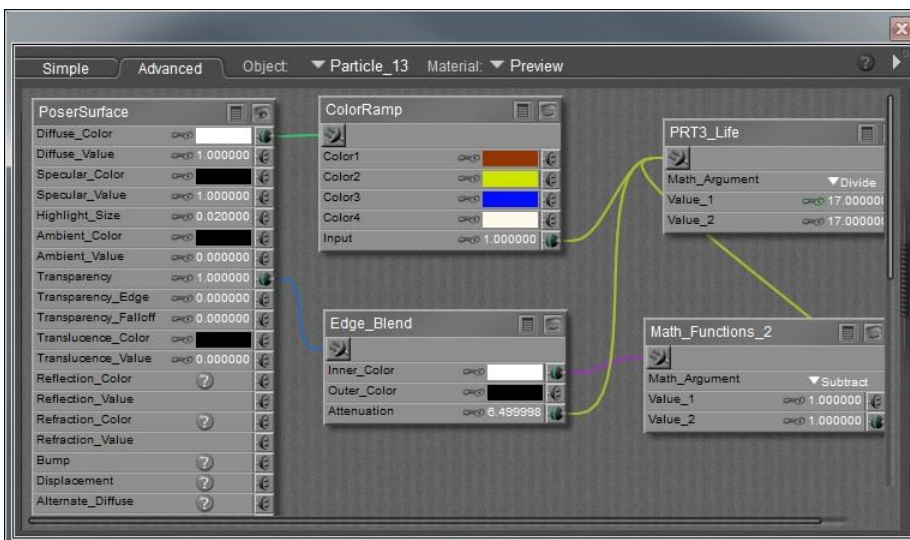


The subtract node is used to invert the value of the PRT3\_Life node to get a range from 1 (fully visible to 0 invisible) and this value is plugged into the transparency channel.

This is the result:

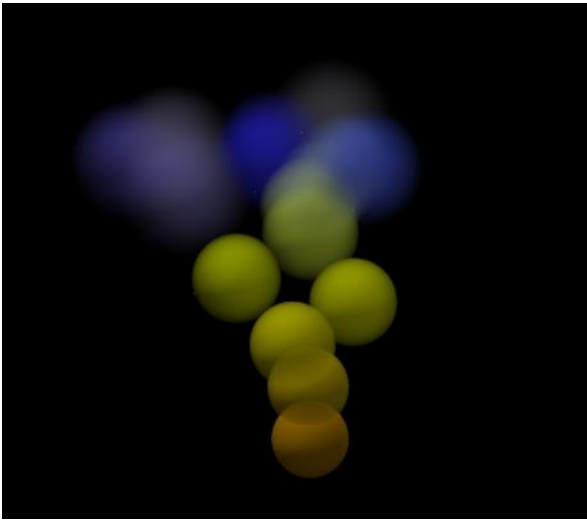


To make it even more interesting we can soften the edges with a edge\_blend node



The Edge\_Blend nodes inner color is the general transparency of the previous example. The PRT3\_Life node is now plugged into the Attenuation as well to make the edges fade away over time

With this result





## Sprites

Sprites are a special kind of particle objects. They are flat squares but have one additional feature – they face the camera.

The Sprites can have texture maps applied to them which gives them interesting possibilities in combination with some of the material nodes.

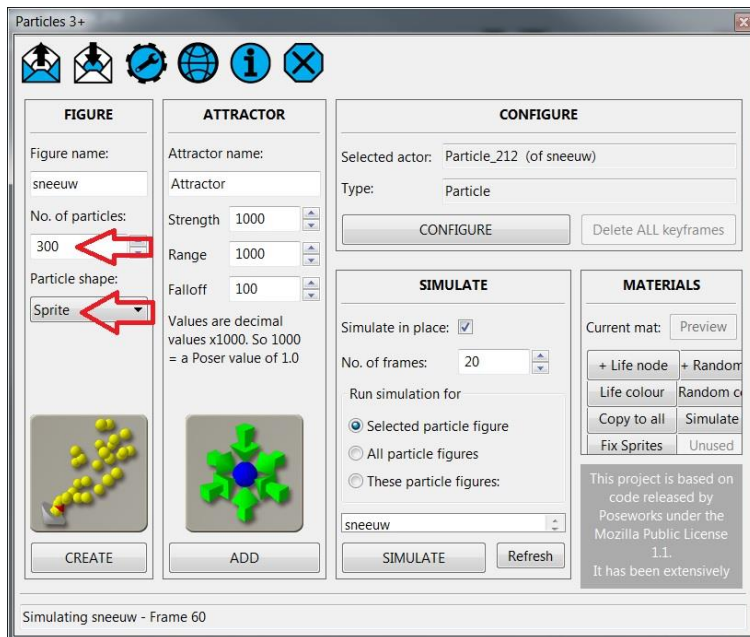
There are some caveats however. The squares have hard edges and nodes like Edge\_Blend do not work very well these squares. The solution is to apply transparency maps. You can animate these texture maps with poser materials and even use multiple maps through Blend, ColorRamp or other nodes.

The sprites angle needs to be towards the camera, so after simulation, you need to run Fix Sprites in the Materials section of the Particles script to correct their angle.

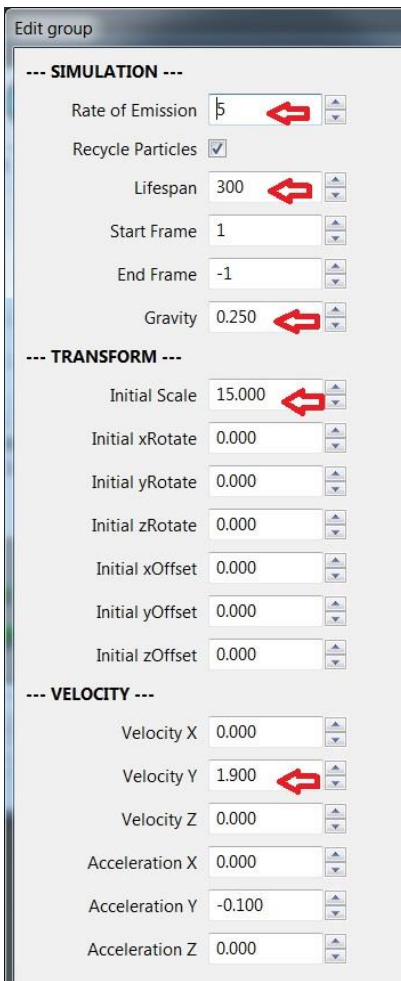
The sprites are very light weight so you can add many of them without too much drain on the resources.

Here is a simple example of using sprites:

We start of with creating a sprite particle figure



Here we created 300 particles. Be aware that the simulation will take longer as normal

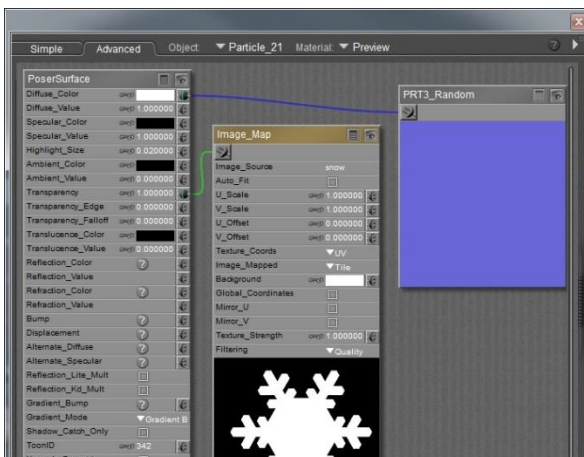


I have used 60 frames for the scene and I have 300 particles, so now I set the rate of emission at 5 to have all particles out there when the simulation is finished. The lifespan of the particles has been adjusted to that as well.

I changed the gravity to a lower value so gravity has less pull on the particles. The initial speed has been set to 1.9

I added a growth variance to the particles as well to make them different sizes (1)

Next I changed the material on the particle. Select body of the material and I used the following materials:



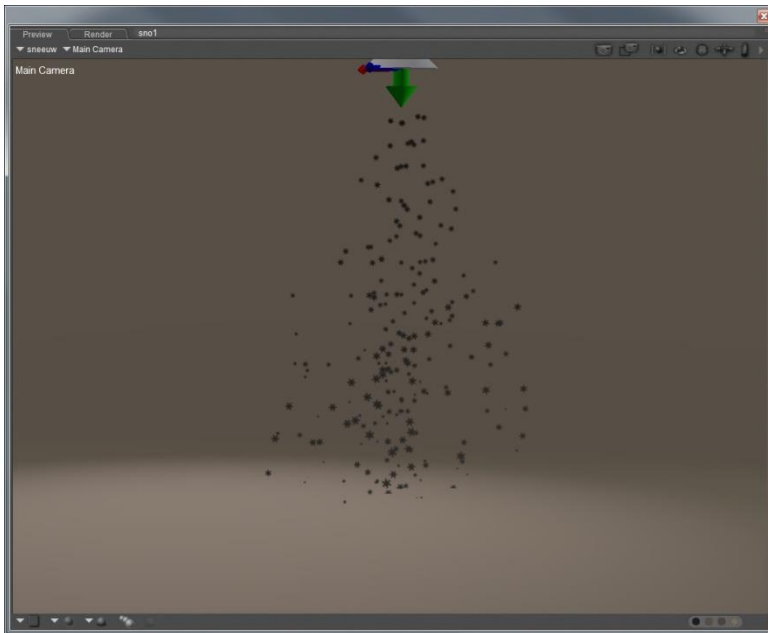
The image file is a simple shape I created in a graphics program and the PRT3\_Random node is one I added via the Particles 3+ script. The PRT3 Random node generates a random color.

Now use the Copy to All and the Simulate in the material section of the Particles script to copy all the nodes to the particles.

Run the Particles 3+ Simulate

Now you have to run the Fix Sprites from the material section to update the angles of the sprites

This is the preview of the scene setup I have used:



I moved the emitter to above before I ran the simulation and turned it around

And this is the result after I made some small scene changes: Made background white, hid the ground, and lit the particles and made a render.



## Presets

There are a set of Presets included which show the different techniques which can be used

The presets are located in the Scene folder in the Poser runtime. The presets contain the particles figure and emitter and have the simulations and materials set up. The Import preset button does not work here. It can only be used for the original Particles 3 presets.

**Note:** Double click will import the scene and keep your current lights and render settings. When testing the preset you might initially want to use the Load scene (double arrow) so it replaces the render settings and lights.

Load the scene and at the last frame (usually frame 30) you will see the full simulation. If you want to change, simply load the Particles3+ script and run the simulation. After it is finished, you may need to run the material simulate as well to synchronize the Particles special nodes. If sprites are used you need to use the Fix Sprites button as well.

**Smoke** shows particles with a cloud like structure which fades over time

**Explosion** uses the pill particle to emulate an explosion. The color ramp is used to change color and transparency over time

**Letters** uses the color ramp in a different way – it loads textures in the color ramp colors and they are animated by means of the PRT3\_life node. Also a PRT3\_Random node is used to change colors.

**MagicDust** uses sprites to simulate falling sand or dust

**Clouds** is an attempt to create a cloud

**Confetti** shows the color ramp again with transmaps to change the shape and random colors

## Trouble shooting and Tips

### ***My simulation does not follow my new configuration!***

You may have set keyframes accidentally.

Solution: Select the body of the Particle figure, and press Delete All Key frames. Check now if all the parameters in the configuration are still OK, if so run the simulation again.

### ***I do not see the Particles 3+ script when I am in the material room!***

The script uses the same UI convention as Poser. Each room has its own set of tools. You can start the Particles script again in the Material room so you have it available there as well

### ***Screen does not update correctly in Preview***

You may have to do a Render!Reload Textures from the menu