Logical Particles

All the particle system components act on *logical particles*. Each particle has a logical representation within the particle system, and this is what the components act upon. Not every logical particle needs to be visualized, and some logical particles could lead to multiple visual particles being drawn on screen.

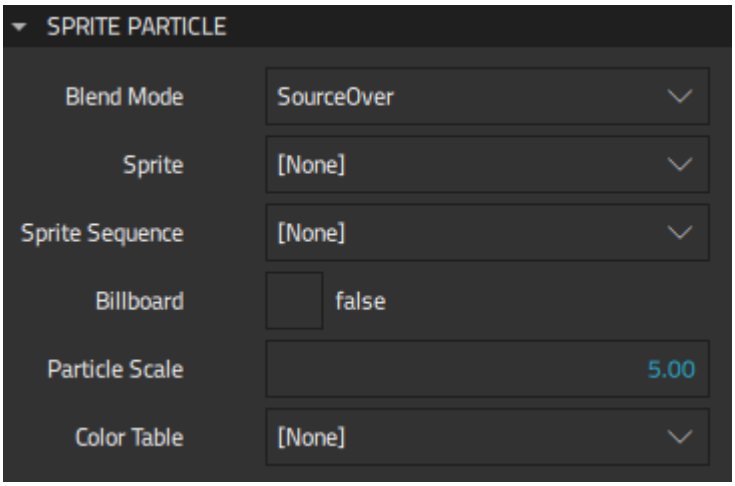
Two different logical particle components are supported: **Sprite Particle** for 2D texture particles and **Model Particle** for 3D model particles. Model particles use instanced rendering to enabled the rendering of thousands of particles, with full materials and lights support.

The following components are available for adding logical particles and for modifying their actions and appearance:

- Sprite Particle
- Sprite Sequence
- Model Particle
- Model Blend Particle

Sprite Particle

Specify properties for sprite particles in **Properties** > **Sprite Particle**.



Blend mode determines whether particles are blended using source over, screen, or multiply mode. If you select **SourceOver**, the pixel component values from a foreground source are written over the source by using alpha blending. If you select **Screen**, the values are negated, then multiplied, negated again, and written. If you select **Multiply**, they are multiplied and written.

Sprite defines the Texture component used for the particles. For example, to use an image of a snowflake to simulate snow, create an instance of the **Texture** component with the image as the **Source**

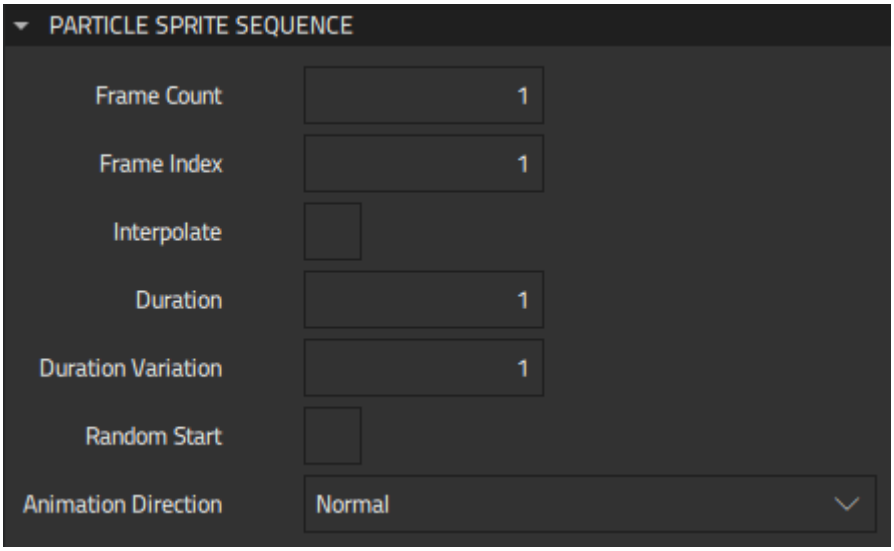
Select **Billboard** to specify that the particle texture should always be aligned face towards the screen. Enabling this property automatically disables **Particle** > **Align mode**.

Particle scale specifies the scale multiplier of the particles. To adjust particle sizes in the emitter, set **Particle Emitter** properties.

In **Color table**, select the **Texture** component that is used for coloring the particles. The image can be a 1D or a 2D texture. Horizontal pixels determine the particle color over the value you set in **Particle Emitter** > **Life span**. For example, when the particle is halfway through its life, it will have the color specified halfway across the image. If the image is 2D, a vertical row is randomly selected for each particle. For example, a 256 x 4 image contains 4 different coloring options for particles.

Sprite Sequence

Specify properties for a sprite particle sequence that contains a frame sequence in **Properties** > **Particle Sprite Sequence**.



Frame count specifies the amount of image frames in a sprite. A particle animates through these frames during its duration. The frames should be laid out horizontally in the same image file. For example, the sprite could be a 512x64 image, with the frame count of 8. This would make each particle frame size 64x64 pixels.

Frame index specifies the initial index of the frame. This is the position between frames where the animation is started. For example, when the frame index is 5 and **Animation direction** is set to **Normal**, the first rendered frame is 5. If the animation direction is set to **Reverse**, the first rendered frame is 4.

The value of **Frame index** must be between 0 and the value of **Frame count** minus 1. When **Animation direction** is set to **SingleFrame** and **Random start** is disabled, all the particles will render sprites with the frame index.

Enable **Random start** to start the animation from a random frame between 0 and **Frame count** minus 1. This allows animations to not look like they all just started when the animation begins.

Interpolate determines whether sprites are blended between frames to make the animation appear smoother.

Duration specifies the time in milliseconds that it takes for the sprite sequence to animate. For example, if the duration is 400 and the **Frame count** is 8, each frame will be shown for 50 milliseconds. When the value is -1, **Particle** > **Life span** is used as the duration.

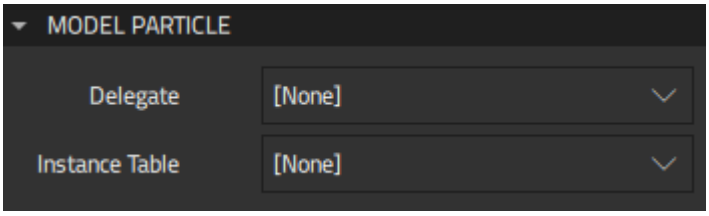
Duration variation defines the duration variation in milliseconds. The actual duration of the animation is between duration minus duration variation and duration plus duration variation.

reverse the normal order. Select **Alternate** or **AlternateReverse** to alternate between normal and reversed orders.

If you don't want to animate the frame, select **SingleFrame**. When **Random start** is disabled, the frame set in **Frame index** is rendered. When it is enabled, each particle renders a random frame.

Model Particle

Specify properties for model particles in **Properties** > **Model Particle**.



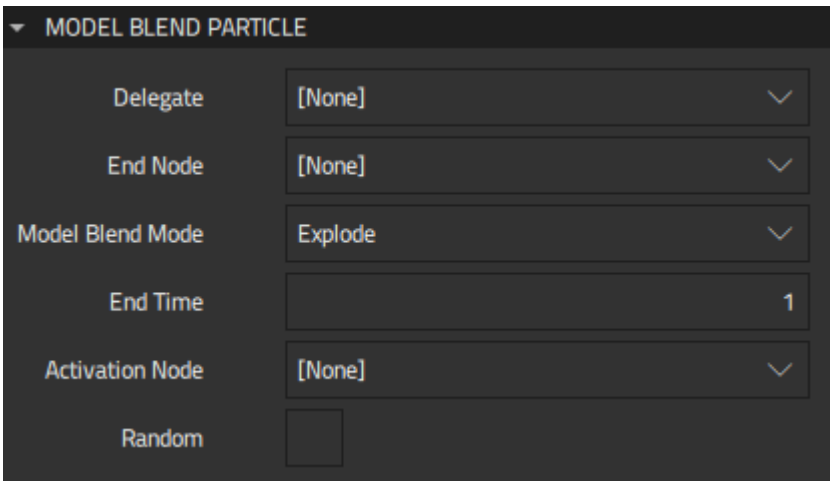
In **Delegate**, select the **3D Model** component that defines each object instantiated by the particle.

Instance table provides you with access to the internal instancing table of the model particle that is used to implement efficient rendering. This table can be applied to the instancing property of models that are not part of the particle system.

You can use this feature also to provide an instancing table without showing any particles. This is done by omitting the delegate.

Model Blend Particle

Specify properties for model blend particles in **Properties** > **Model Blend Particle**.



The **Model Blend Particle** component blends a particle effect with a **3D Model** component. The provided model needs to be triangle-based. Each triangle in the model is converted into a particle, which are then used by the emitter. Instead of particle shader, the model is shaded using the material specified in the model. The way the effect is blended is determined by **Model blend mode**.

The possible blend modes are:

- **Construct**, where the model is constructed from the particles.
- **Explode**, where the model is converted into particles.
- **Transfer**, where **Construct** and **Explode** are combined to create an effect where the model is transferred from

enabled.

In **Delegate**, select the **3D Model** component that defines each object instantiated by the particle.

End node specifies the transformation for the model at the end of a particle effect. It defines the size, position, and rotation where the model is constructed when you set **Model blend mode** to **Construct** or **Explode**.

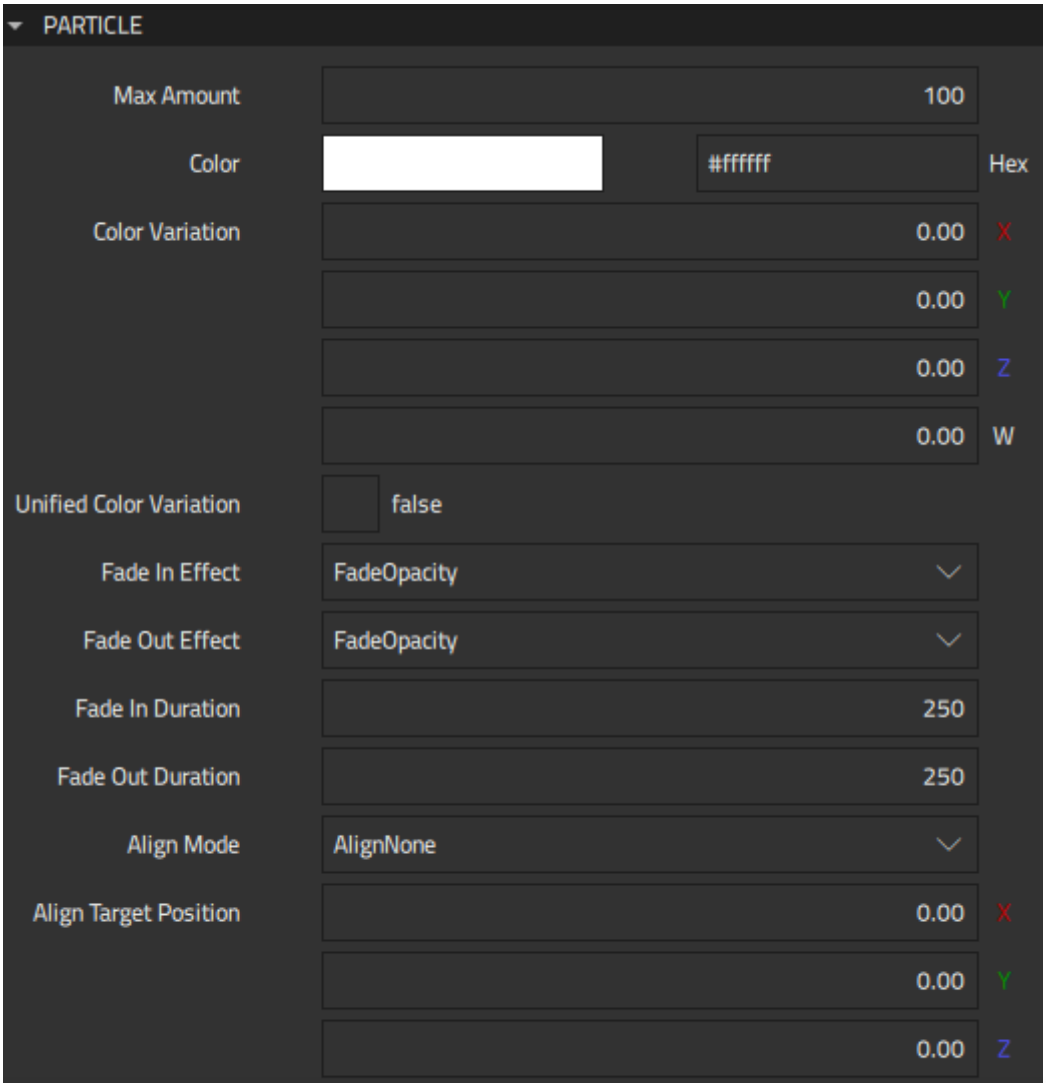
End time specifies the end time of the particle in milliseconds. The end time is used during construction and defines duration from particle lifetime at the end where the effect is blended with the model positions. Before the end time, the particles' positions are defined only by the particle effect, but during the end time the particle position is blended linearly with the model end position.

In **Activation node**, select the component instance that activates particles and overrides the regular emit routine. The activation node can be used to control how the particles are emitted spatially when the model is exploded or constructed from the particles. The activation node emits a particle if the center of that particle is on the positive half of the z-axis of the activation node. Animating the activation node to move trough the model will cause the particles to be emitted sequentially along the path the activation node moves.

To emit particles in random order instead of in the order in which they are specified in the model, select **Random**.

Common Particle Properties

The properties that you specify for logical particles in **Properties** > **Particle** determine the common appearance of all particles.



Max amount allocates data for particles. Setting this value instead of just growing the data based on **Particle Emitter** > **Emit rate**, **Life span**, and **Emit Bursts** enables you to optimize memory usage and to modify the emit rate and life span without reallocation.

Color determines the base color for particles. You can use the Color Picker to select colors. For color variation, set values in **Color variation**. The values are in RGBA order (X=red, Y=green, Z=blue, and W=alpha), and each value should be between 0.00 (no variation) and 1.00 (full variation).

To apply color variation uniformly for all the color channels, enable **Unified color variation**. This applies all variations with the same random amount.

Fade in effect and **Fade out effect** define the fading effect used when the particles appear. Fading is implemented by changing the value of opacity or scale between 0 and 1 over the time specified in milliseconds in **Fade in duration** and **Fade out duration**. Fading duration is calculated into the particle lifespan. For example, if **Particle Emitter** > **Life span** is 3000, **Fade in duration** is 500, and **Fade out duration** is 500, the particle will be fully visible for 2000 ms.

Align mode determines the direction that particles face:

- Select **AlignNone** to use the value set for the emitter component in **Particle Rotation** > **Rotation**.
- Select **AlignTowardsTarget** to align the particles towards the direction set in **Align target position**.
- Select **AlignTowardsStartVelocity** to align the particles towards their starting velocity direction.

This value takes no effect if **Sprite Particle** > **Billboard** is enabled.

Unlike the materials used with the models, particles default to being rendered with assuming semi-transparency, and so with blending enabled. This is the desired behavior most of the time due to particle textures, color (alpha) variations, fadings, and so on. If you don't need the blending, disable **Has transparency** for possible performance gain.

Sort mode determines the order in which the particles are drawn. You can sort particles based on their distance from the camera, farthest first, or lifetime, newest or oldest first.

The particles are emitted from the location of the Emitter or Trail Emitter component instance.

‹ Particle System

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