

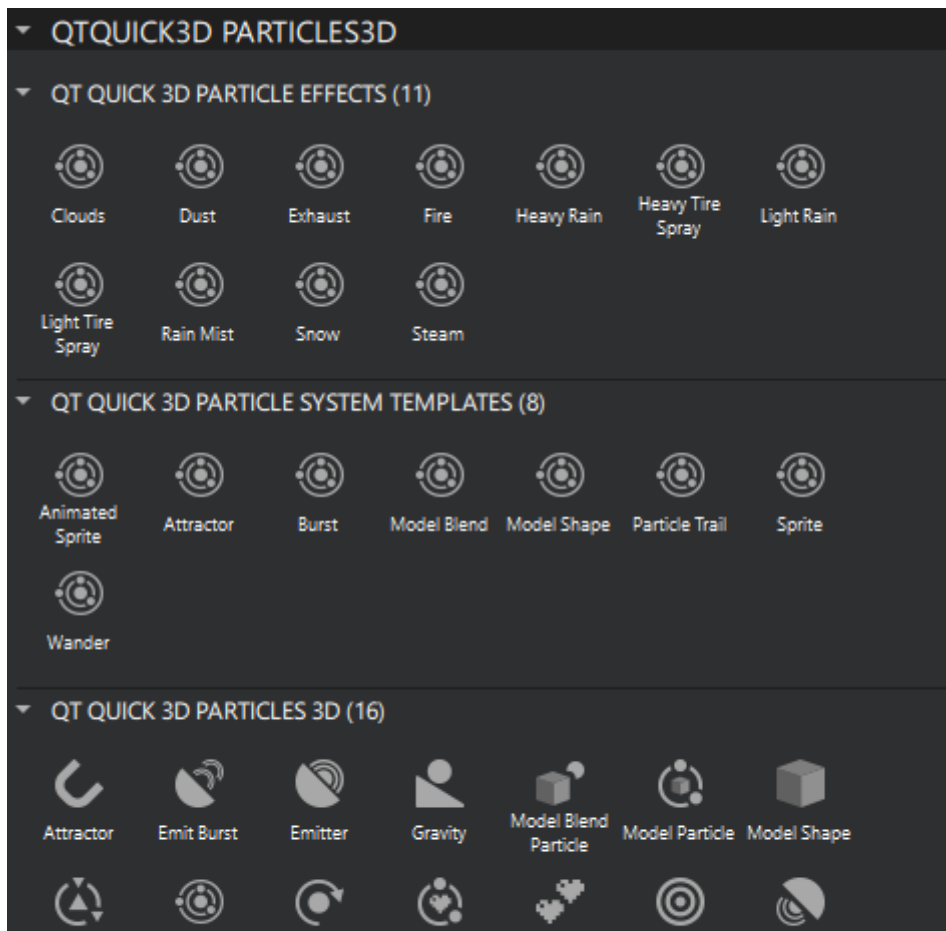
粒子

使用粒子系统，您可以使用精灵、3D 模型或图像来创建传统渲染技术难以重现的效果。这包括混沌系统，自然现象或由化学反应引起的过程。例如，您可以模拟火、烟、火花、爆炸、流水、雾、雪、星星和星系。

Qt设计工作室粒子系统包含以下主要类型的组件：

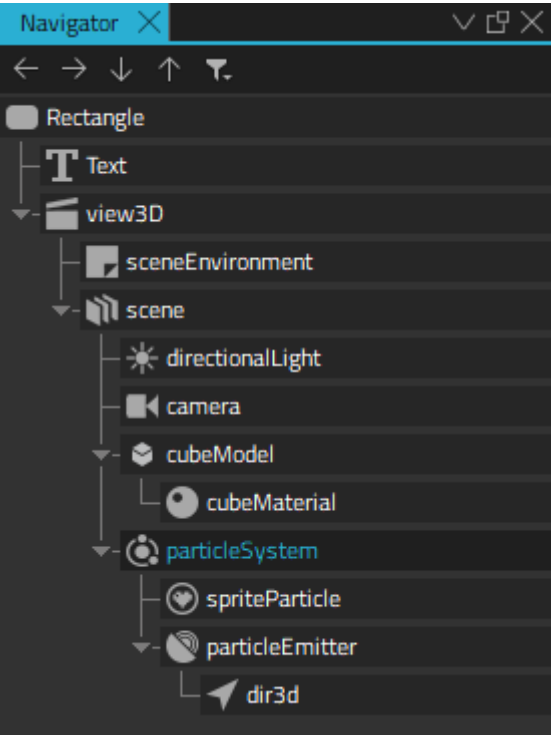
- › 粒子系统
- › 逻辑粒子
- › 粒子发射器
- › 粒子影响器
- › 粒子方向

添加 **QtQuick3D** 后，预设粒子**组件**、**模板**和**效果**在组件> **QtQuick3D 粒子3D** 中可用。**粒子3D**模块到您的项目，按照**添加和删除模块**中的说明。



颗粒组件

当您**将粒子系统组件的实例**添加到场景中时，Qt Design Studio 会自动为您添加**精灵粒子**、**发射器**和**矢量方向**组件的实例。










精灵粒子是一个视觉 **2D 纹理**粒子。要使用 **3D 模型**粒子，请将**“模型粒子”**组件的实例添加到粒子系统。在**“属性”>“粒子”>“最大量”**中定义要使用的**粒子量**非常重要，以便分配最佳缓冲区大小。您还可以指定粒子的颜色和不透明度，以及它们淡入和淡出的速度。

发射器组件发射子画面或模型粒子。您可以指定粒子形状及其发射区域。使用粒径和旋转的变化来获得更自然的结果。此外，定义发射粒子的寿命和初始速度方向。

通常，情感因子用于使粒子运动更有趣。例如，可以添加**重力**组件的实例来模拟下落的物体，**添加一个漫游**组件的实例来模拟沿着波浪形曲线飞行的物体，或者添加**一个点旋转器**的实例来模拟多风的天气。

The following table lists preset particle components.

Icon	Name	Purpose
	Attractor	Attracts particles towards a specific point.
	Emit Burst	Generates declarative emitter bursts.
	Emitter	Emits logical particles.
	Gravity	Accelerates particles to a vector of the specified magnitude in the specified direction.
	Model Blend Particle	Blends a particle effect with an instance of a Model component.
	Model Particle	Creates a particle that uses an instance of a Model component.
	Model Shape	Provides 3D shapes from a model to emitters and affectors.
	Particle Shape	Provides 3D shapes to emitters and affectors.

	Point Rotator	Rotates particles around a pivot point.
	Sprite Particle	Creates particles that use a 2D sprite texture.
	Sprite Sequence	Provides image sequence features for Sprite Particle component instances.
	Target Direction	Specifies a direction towards the target position.
	Trail Emitter	Emits logical particles from other particles.
	Vector Direction	Specifies a direction towards the target direction.
	Wander	Applies random wave curves to particles.

Particle Templates

A particle template is a preset of particle components that you can use to create specific particle effects in a convenient way.

The following table lists particle templates and their components.

Template	Components
Animated Sprite	<div>Particle System</div> <div><div>› Particle Emitter</div><div>› Sprite Particle</div><div>› Sprite Sequence</div><div>› Texture</div></div> <div>› Vector Direction</div>
Attractor	<div>Particle System</div> <div><div>› Particle Emitter</div><div>› Sprite Particle</div><div>› Vector Direction</div></div> <div>› Particle Attractor</div>
Burst	<div>Particle System</div> <div><div>› Particle Emitter</div><div>› Sprite Particle</div><div>› Vector Direction</div><div>› Emit Burst</div></div>
Model Blend	<div>Particle System</div> <div><div>› Particle Emitter</div></div>
Template	<div>› Node</div> <div>Components</div>

	<div>› Vector Direction</div>
Model Shape	<div>Particle System</div> <div><div>› Particle Emitter</div><div><div>› Sprite Particle</div><div>› Vector Direction</div></div></div> <div>› Particle Model Shape</div>
Particle Trail	<div>Particle System</div> <div><div>› Trail Emitter</div><div><div>› Vector Direction</div><div>› Sprite Particle</div></div></div> <div><div>› Particle Emitter</div><div><div>› Vector Direction</div><div>› Sprite Particle</div></div></div>
Sprite	<div>Particle System</div> <div><div>› Sprite Emitter</div><div><div>› Sprite Particle</div><div>› Vector Direction</div></div></div>
Wander	<div>Particle System</div> <div><div>› Sprite Emitter</div><div><div>› Sprite Particle</div><div><div>› Texture</div></div></div></div> <div><div>› Wander</div><div>› Node</div></div>

Particle Effects

A particle effect is a ready-made effect that you can use to create, for example, fire, rain, or mist in a convenient way.

The following particle effects are available:

- › Clouds
- › Dust

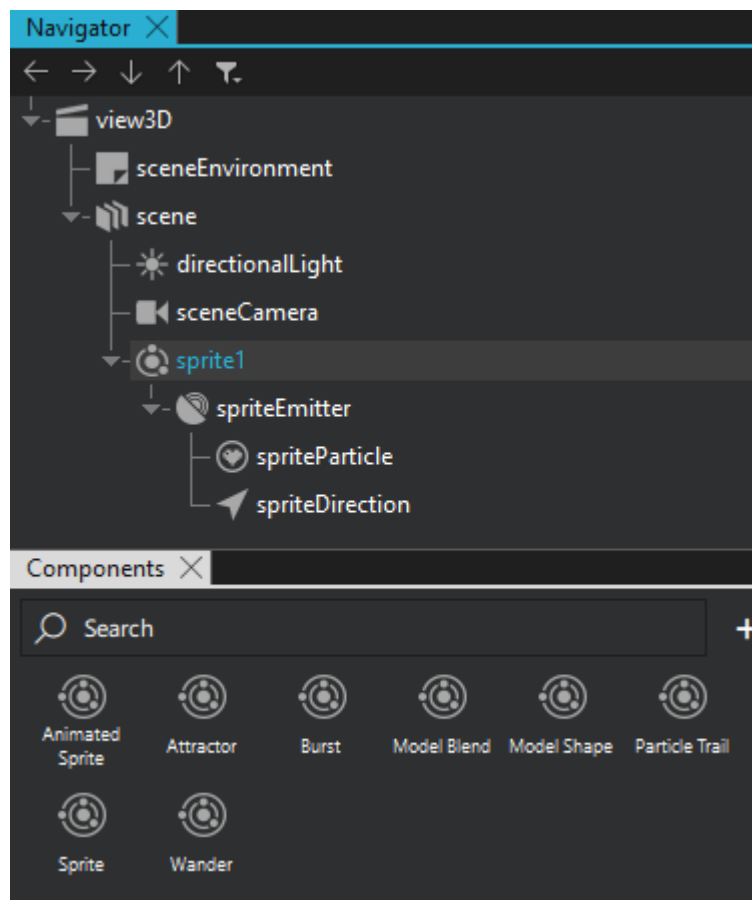
- › Heavy Rain
- › Heavy Tire Spray
- › Light Rain
- › Light Tire Spray
- › Rain Mist
- › Snow
- › Steam

Adding a Particle System

The recommended way to add a particle system is to use one of the [particle templates](#) and then add or remove particle components according to your use case.

For example, to add a particle system that emits sprite particles:

- › From **Qt Quick 3D Particles System Templates** in **Components**, drag **Sprite** to a scene component in **Navigator**. You can also drag it to the **3D view**.



Performance Considerations

The particles are designed to be usable on a variety of hardware on desktops, as well as mobile and embedded devices. However, in addition to rendering the maximum amount of particle elements on the screen, extensibility to different use-cases, rendering quality, integration with the other UI elements, are also important.

particles by using a [timeline](#). The model particles use instanced rendering to boost the performance. Therefore, OpenGL ES 2.0 isn't sufficient to make rendering performant, and at least OpenGL ES 3.0, Vulkan, or some other modern backend is required.

To get a more concrete view on the actual performance, the video below shows a particles Testbed application running on four different Android devices. These devices and their chipsets and GPUs could be considered to be lower-end to mid-range, confirming that the particles can perform well also on affordable hardware.

Particle System Tutorials

- › [Particle System: Fire Effect](#)
- › [Particle System: Rain and Snow Effect](#)

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