PhysX and APEX Overview

KGC 2011

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What is PhysX?

PhysX is a scalable multi-platform game physics solution supporting a wide range of devices, from iPhone to high-end multicore CPUs.

NVIDIA Confidential

What kind of technology is PhysX?

An SDK. Libraries, solvers, debugger, profiler.

PhysX is an SDK for game developers that provides:

- **Discrete and continuous collision detection.**
- **Rigid body, fluid, particle and cloth solvers.**
- **Raycasting and shape sweeps.**
- **Vehicle and character controllers.**
- **PhysX Visual Debugger / profiler.**
- **DCC tool plugins.**
- **Samples…and support.**

Does PhysX only run on GPUs?

No!

- PhysX runs on PS3, Xbox 360, Wii, Win32/64, Mac… plus iPhone and Android devices.
  - GPU-accelerated PhysX is found *only* on Win32/64.
  - PhysX pipeline uses CPU even when GPU acceleration is enabled.
- All features that run on GPU are also available on PC-CPU and console implementations.

Debugging & Profiling

- Unified debugging and profiling tool – PVD
  - All-in-one tool to develop PhysX applications
  - Also for major platforms

What else is new and better about PhysX-3?

It is a unified cross-platform solution:

Windows, PS3, Xbox 360,

OSX, Linux, Android and iOS from ONE codebase.

What else is new and better about PhysX-3?

*Event Profiling for **all platforms** within PhysX Visual Debugger.*

What else is new and better about PhysX-3?

Support for large levels & streaming:

- Broadphase clustering
- Binary In-place serialization
- Out-of-scene actor creation

What's the bottom line about PhysX?

PhysX helps developers to make better games.

- PhysX is a complete physics solution.
- PhysX is a core component for game-play *and* effects.
- PhysX is highly competitive on all major platforms: consoles, mobile devices…and PCs, with or without GPU acceleration.

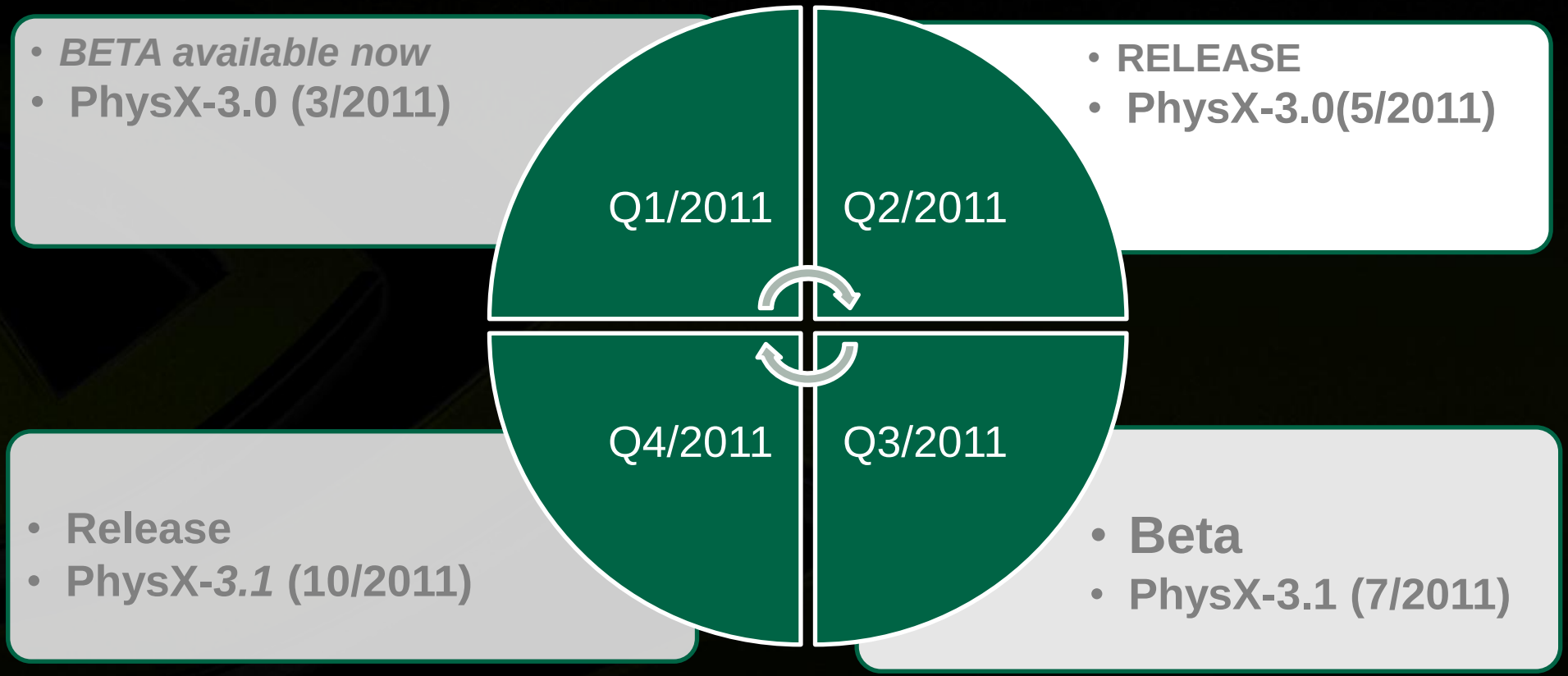
PhysX SDK 2.8.4 Status

- PhysX-2 is being replaced by PhysX-3.
- PhysX SDK 2.8.4 is the last of the 2.x series.
- There will be no major new features introduced on PhysX-2.8.4.
- We will continue to support 2.8.4 for all customers still using it.
  - Bug fixing.
  - Performance improvements where practical.
- Nearly all customers will move to PhysX-3 within 2 years.

PhysX-3 Status and Roadmap

- PhysX-3 is in beta now. Binary packages and source licensing are available.
- New features and major optimizations will appear in *minor revisions* (3.0, 3.1, 3.2)
- PhysX-3 will adhere to a 6-month release schedule for minor revisions:
  - PhysX-3.0 is **now** in beta in Q1/2011, will be released in Q2/2011.
  - PhysX-3.1 will be in beta in Q3/2011, will be released in Q4/2011.
  - PhysX-3.2 will be in beta in Q1/2012, will be released in Q2/2012.
  - PhysX-3.3 will be in beta in Q3/2012, will be released in Q4/2012.
  - Etc.
- Patch releases (bug fixes, e.g. 3.0.1, 3.0.2, etc.) will appear as needed.
  - Probably 3x per quarter for recent releases (once per month).
  - For mature releases, expect 1x per quarter.

PhysX-3 SDK: Annual Development Cycle



APEX Overview

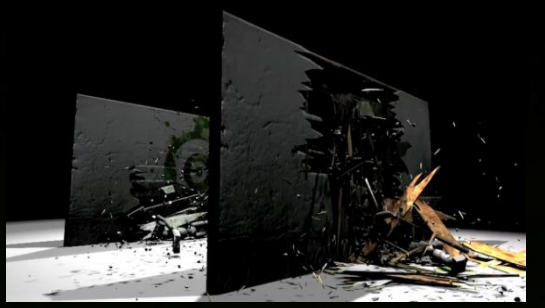
NVIDIA

APEX in Games

and more games in development …

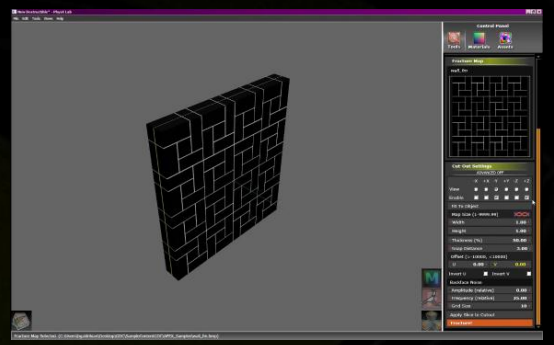
What is APEX ?

- APEX is a “Scalable Dynamics Framework”
  - *Scalable*: Content adapts to different hardware capabilities
  - *Dynamics*: The way things move and interact
  - *Framework*: A structured environment



- APEX consists of two major components:
  - Authoring:
    - High-level authoring of dynamic systems
    - DCC plugins, standalone tools, and game engine plug-ins
  - Runtime:
    - A modular SDK – minimal integration into game engine
    - Leverages PhysX for simulations

APEX Architecture



Authoring

DCC Plug-In

Standalone APEX Tools

Destruction

Clothing

Particles

.....

APEX Core

Renderer

PhysX SDK

Consoles

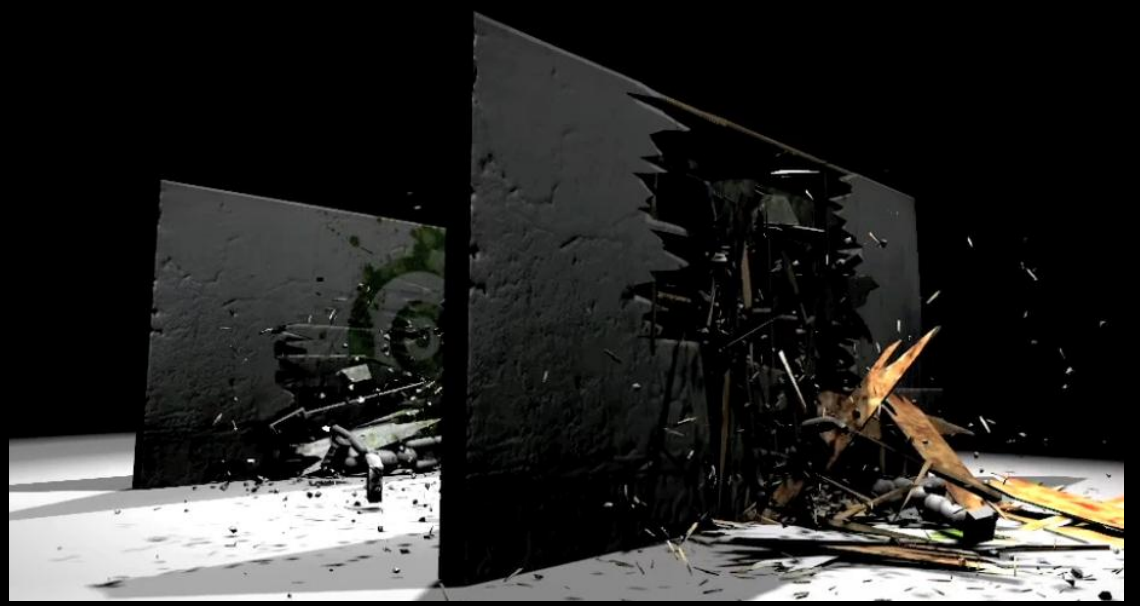
PC

PC +GPU

Run-time

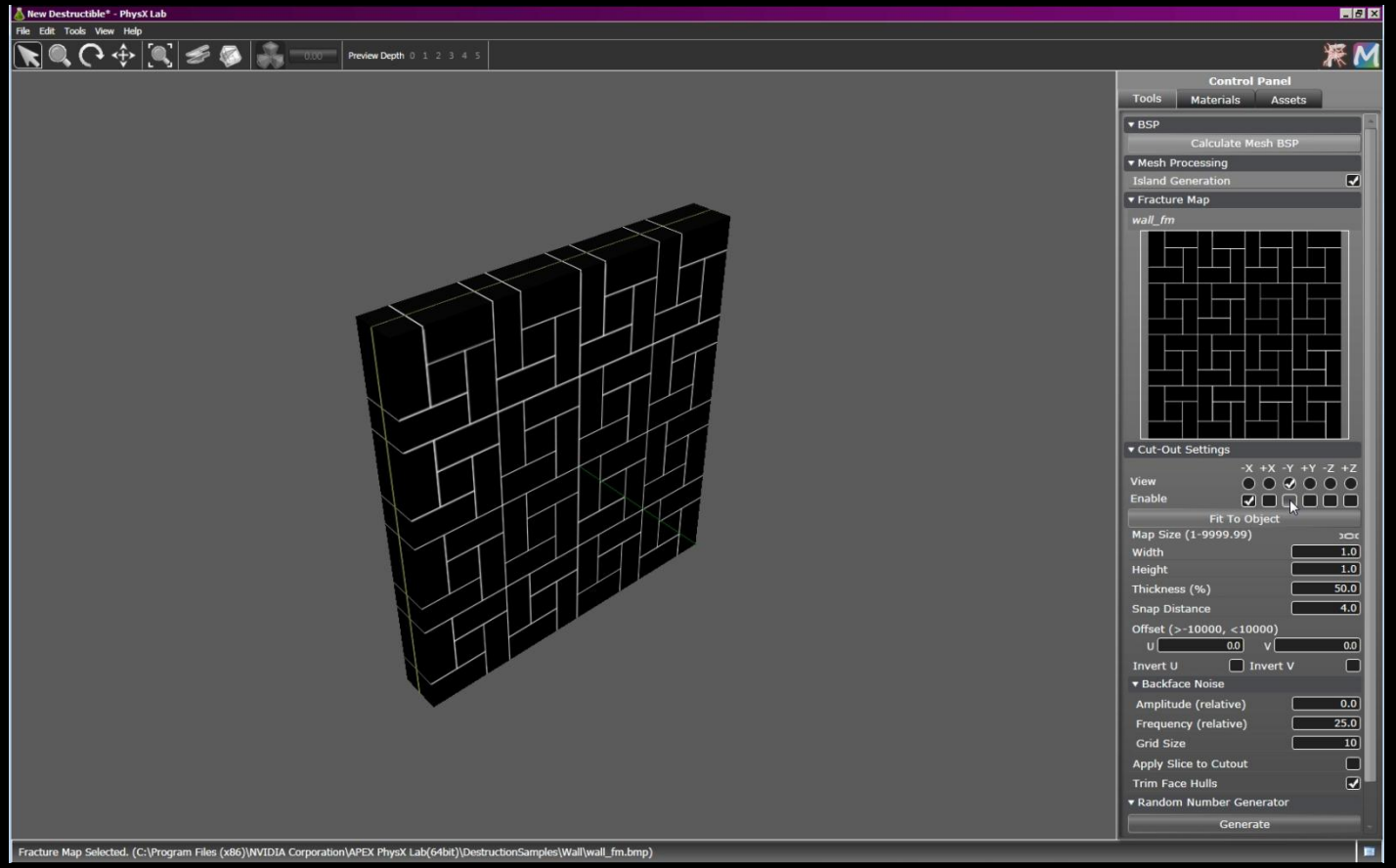
APEX Destruction

- Fully and partial destructible environments
- PhysXLab tool with preview functionality
- Fully integrated with APEX Particles
- Fracture with noise
- Hierarchical destruction
- Plastic deformation
- Level of Detail
- Scalability



APEX Destruction

Authoring Pipeline



APEX Destruction

Realtime example of authored destruction asset

APEX Clothing

- Hybrid of simulated and skinned clothing
- DCC tools with preview functionality
- Level of Detail (physical simulation and graphics)
- Animation blending
- Clothing constraints
- Scalability

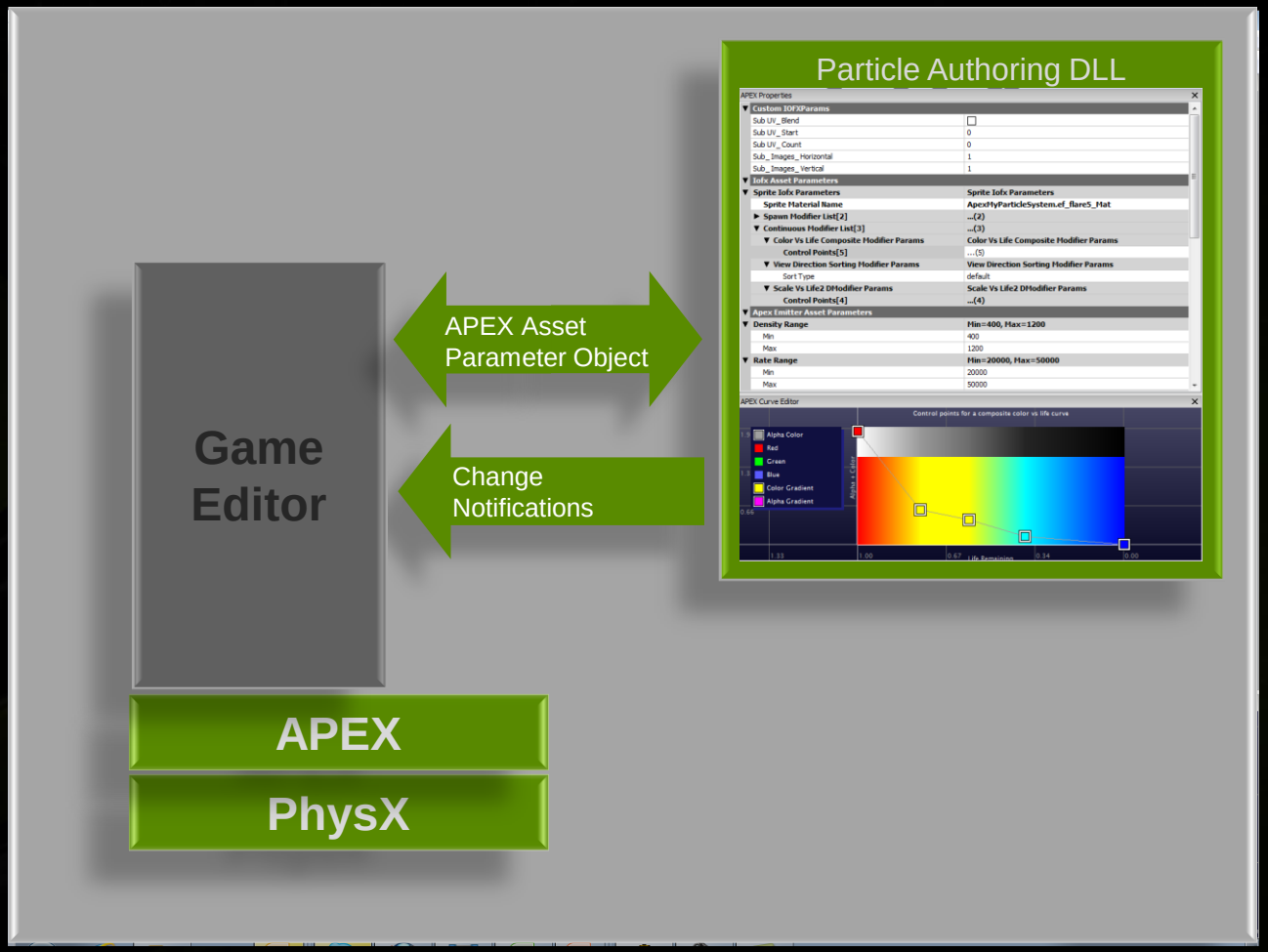
APEX Clothing

APEX Particles

- Full Collision with PhysX environment
- Force fields (wind, explosions)
- Authorable behavior and effect modifiers
- Renderable as sprites or meshes (with orientation)
- Generic emitter
- Special purpose emitters
  - Air/Ground emitter
  - Weapon emitter

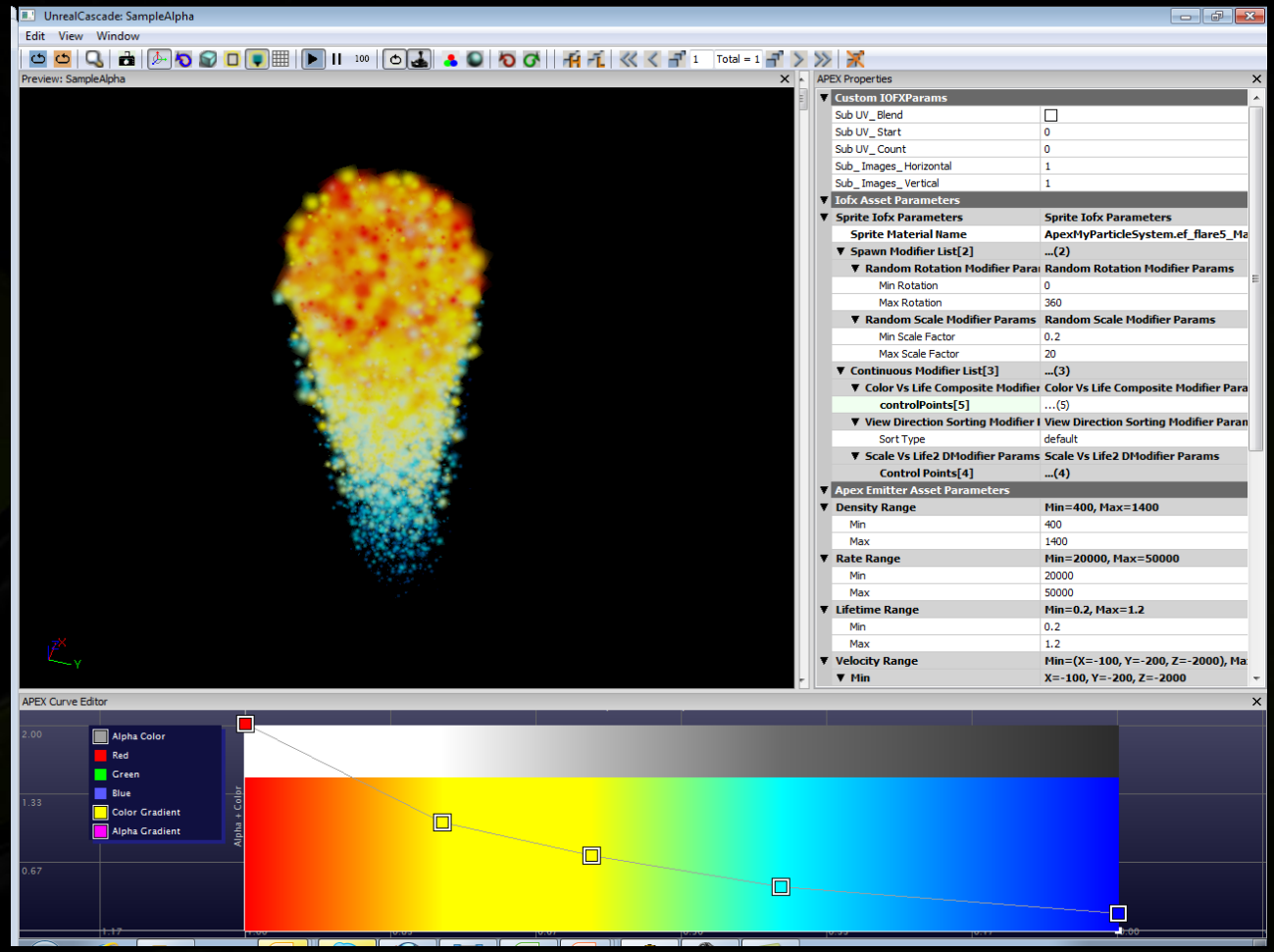
APEX Particles

Particle Authoring DLL



APEX Particles

Authoring Pipeline



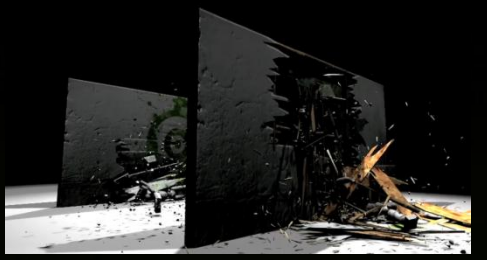
APEX Turbulence

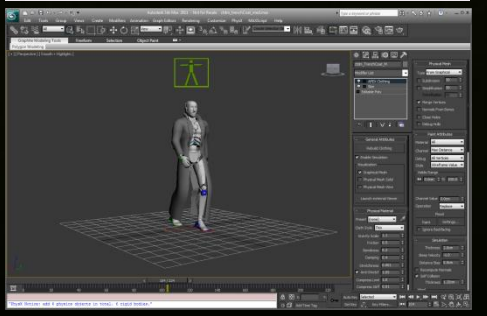
APEX 1.0 Features

(currently in public beta)

- APEX SDK (Destruction, Clothing, Particles)
  - Improved Level of Detail (LoD)
  - Debug Visualization (Destruction, Clothing, Particles)
  - Serialization enhancements (console specific binary)
  - Destruction memory improvements
    - support for compressed vertex buffer format
    - mesh optimizations
  - Clothing performance improvements
  - PhysX 2.8.4 support
  - APEX Samples

- APEX Authoring Tools
  - Improved 3ds Max/Maya Clothing plug-ins
    - Stability, Ragdoll enhancements
  - Improved PhysXLab
    - UI, Stability, different slice settings at different depth





APEX 1.1 Features

(currently closed beta; public beta planned for October)

- APEX SDK (everything from APEX 1.0 plus)
  - APEX Destruction with GPU Rigid Bodies (GRBs)
    - Accelerated rigid bodies simulation on GPUs with support for more than 10,000 chunks
    - Seamless integration into APEX Destruction
  - APEX Clothing
    - Clothing mesh-mesh skinning authoring improvements
    - Clothing morph target support
  - Improved console performance

APEX 1.2 Features

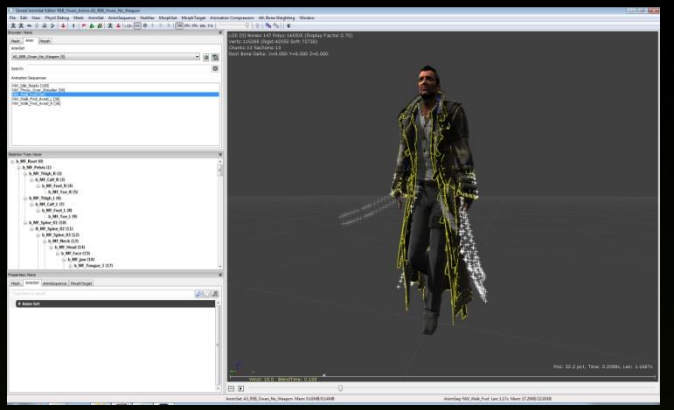
(closed beta September 2011; public beta in November)

- APEX SDK (everything from APEX 1.1 plus)
  - Support for PhysX SDK 3.1
    - New Clothing Solver
  - More console memory/performance improvements

- APEX Authoring Tools
  - Support for PhysX 3.1

APEX 1.0 available NOW in UE3

- March 2011 QA
  - APEX Clothing
    - Simulates in AnimsetViewer / AnimTree
    - Physical and Graphical LOD
    - DCC tools: 3dsMax/Maya Clothing plug-in
  - APEX Destruction
    - Standalone tool: PhysXLab
  - Support all PhysX and APEX Debug Visualization



- https://udn.epicgames.com/Three/APEXOverview

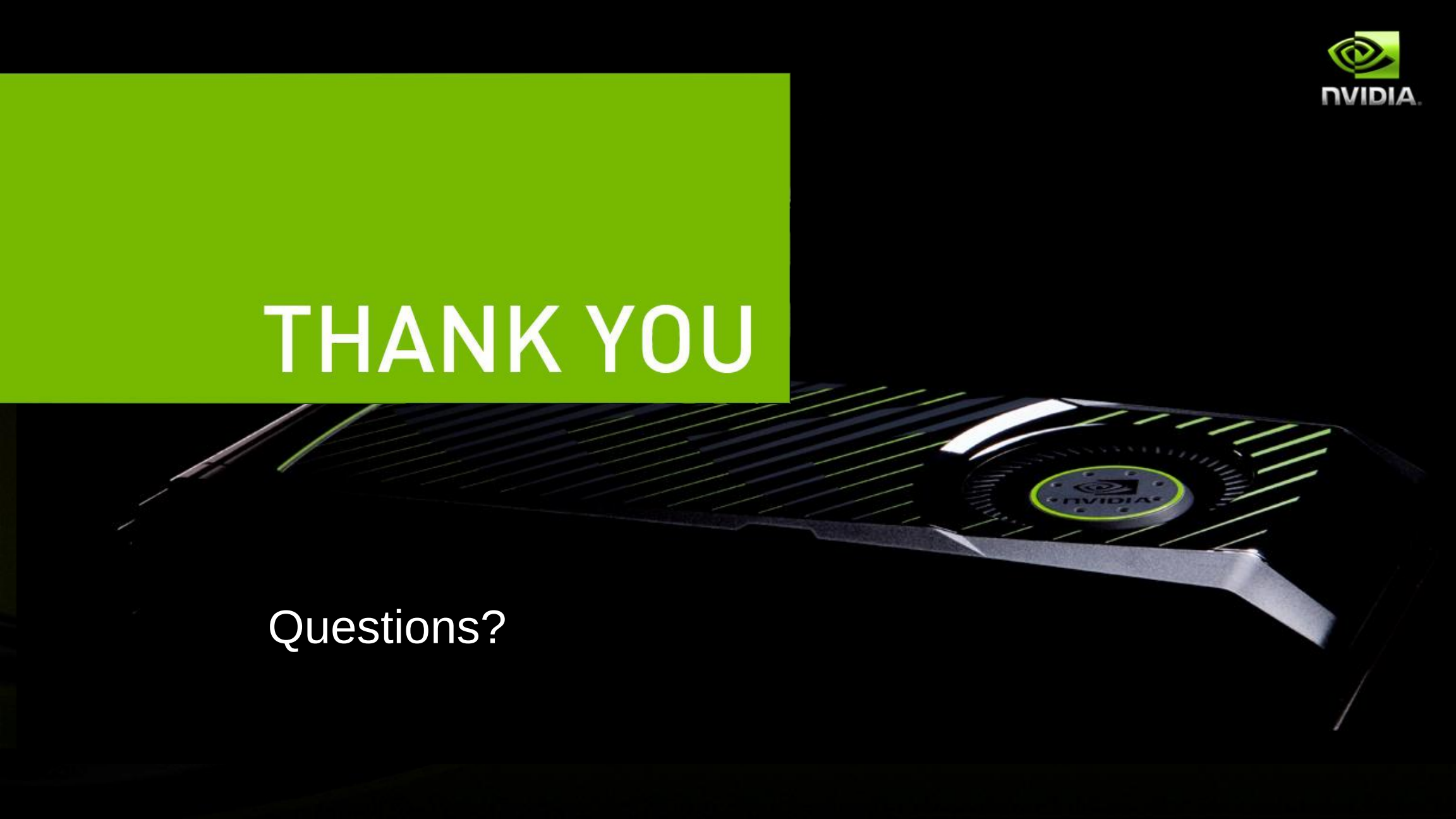
- http://developer.nvidia.com/object/apex.html

From where can I get APEX ?

Register at NVIDIA Developer Zone and
request access for APEX SDK and APEX Tools

http://developer.nvidia.com/object/apex.html

THANK YOU



Questions?