Laser light is sexy light. It produces the purest, tightest beams you can imagine. That’s why it is routinely used as a special effect in large-scale events like the Olympics, concert tours, and world sports ceremonies. The saturated colors and pencil-thin shafts, choreographed to music, make an indelible impression on the viewer.

One reason lasers have not been used in smaller-scale, budget-oriented productions is that, until recently, the equipment has been somewhat difficult to work with. Previously, powerful lasers required 220V or 440V of electrical power along with water-cooling. The show programming also was customized and did not have interfaces to DMX or standard artwork creation packages.

Fortunately, in just the past few years, technology has brought major changes:

• The laser light source has gone “solid-state,” using diodes and crystals instead of large water-cooled tubes. These lasers can run off standard 120V wall current and are roughly the size of a breadbox.

The Universal 360 show incorporates eight lasers arranged around the theme park’s central lagoon.
• New laser controllers can be run from DMX controllers. Some can also control DMX as part of their show programming.
• Laser projectors are increasingly being designed to look and work like a standard lighting instrument.
• For laser graphics, artwork can be created using common applications such as Adobe Flash and Autodesk 3ds Max.
• New regulations and technologies in the US will allow safe, direct scanning of the audience, as has been common in Europe and Asia for the past 30 years.

The total effect is that it is much more production-friendly to use lasers in both small and large shows.

New Lasers
Lasers can be single color, such as the commonly-seen lime green, or they can mix two or three beams to get multiple colors. The Holy Grail is a red-green-blue (RGB) laser, capable of producing just about any desired color. Depending on the laser’s wavelengths, this can give rare and stunning colors such as a dark blue or deep purple.

Arctos Laser of Germany has produced one of the highest power RGB lasers available. The Arc Essential 25 combines an impressive 62 laser diodes to produce over 25W of white light, using standard 120V power, in a package that is only 29”x17”x12”. This is enough power to fill even the most demanding type of show.

Another approach is to use multiple smaller lasers. This is especially useful for European-style audience scanning shows, since each laser has less power (and, thus, is safer), yet the multiplicity of lasers means beams can be everywhere.

For the 2006 MTV Europe Awards, UK company Laser Grafix used 19 2W breadbox-sized green lasers in the truss, plus four 10W green lasers on stage. The result was a veritable sea of green laser beams, which totally immersed the band Muse. The performance can be seen on MTV’s website at www.mtv.com (the lasers start about a minute and a half into the clip).

In July 2006, Universal Studios Florida also took the multiple-laser approach. The new Universal 360 (LD, November 2006) nighttime show incorporates many effects, including eight lasers arranged around the theme park’s central lagoon. Four of the lasers are green diode-pumped solid-state (DPSS) in a moving light-type configuration. The other four are full-color (RGB) DPSS units. This gives Universal a mix of higher-power green plus the variety of multiple colors. Generally, the most bang for your buck comes from single-color green lasers. To get white-light RGB at the same power and visibility level costs more, just as a full-color LED screen costs more than a single-color version.

Improved Control Systems
There are two main ways to use lasers. One is to create a beam show with mid-air effects. The other is to project scanned graphics onto a surface. In both cases, the best effects use computer-controlled mirrors called scanners to precisely place and trace the laser’s light. Today, many laser projectors incorporate DMX, allowing the operator to project both beams and graphics right out of the box.

For more custom work, some laser projectors also have computer interfaces. Specialized laser animation software is used to control the tiny scanner mirrors. This software has become much simpler to use since 2000. It is now possible to create a show in Flash or a 3D CAD package and convert it to laser. There are some limitations, since laser graphics are vector (outline) graphics, not raster (TV-style bitmaps). But the bright colors and outlines of laser-scanned graphics are a treat for audiences. The graphics can be scanned
onto just about any surface, and—given a large enough laser—at just about any size.

One project involves scanning SMS text messages onto the side of a mountain. The SMS messages come into a text-to-laser converter from Pangolin Laser Systems of Orlando. These messages are automatically screened and then are converted into vector lettering for the laser scanning system. Pangolin also has been a leader in programs that convert Flash and 3D output into laser-ready artwork.

An advantage of laser-projected graphics is that they have a different look, which makes them stand out. For everyone who has a TV at home, seeing large-screen projectors at events can be just a bigger version of the living-room set. Bright, saturated laser graphics can deliver a unique message.

US Audience Scanning

One of the most exciting developments for US shows is the ability to scan beams directly into an audience. This effect is by far the most beautiful and powerful way to use lasers. Beams can be precisely controlled to output cones, fans, and sheets of light that illuminate thin cross-sections of theatrical fog. By quickly modulating the laser’s color, stripes and dotted lines are “magically” formed in mid-air. Being inside a laser show is like being inside fireworks but much safer, of course!

New techniques have allowed Lighting Systems Design Inc. (LSDI) of Orlando to safely and reliably scan onto audiences. This is done in part by enlarging the laser beam just enough so that its power density is reduced, while overall beam brightness stays the same. In addition, a monitoring system developed by Pangolin keeps watch over the beam movements to ensure light does not build up in any one area. Although there have been systems in the past with scan-fail detectors, the LSDI/Pangolin approach has multiple protective monitoring, making it the only system which has received permission from the US federal government to allow European-style scanning into US audiences.

This effect is so spectacular because it directly touches the audience. Touch is a powerful emotion. Someone right next to you—shaking your hand or patting your shoulder—has a more intimate connection with you than if they are up on a stage talking to you. In a similar way, having laser beams come into an audience makes a real connection with the event. Audience members are no longer watching the event; they are inside it. Show producers in Europe and Asia know this, and now it can come to US shows as well.

Ready To Jump Into The Laser Arena?

Lasers have come a long way since the days of Pink Floyd and planetarium shows. The equipment is much easier to use, and it is more cost-effective to add laser effects. If you want to get started, here are two main ways:

- Work with a laser show company that has experience and equipment to provide stunning laser effects. The International Laser Display Association’s website (www.laserist.org) has a directory to help you find such a company.
- Look into getting laser projectors of your own. Those that emulate standard lighting instruments with DMX control make a great start. The more versatile units will
Laser projectors are increasingly being designed to look and work like a standard lighting instrument.

also have a connector for an ILDA-standard controller. This lets you connect a computer for more versatility and custom laser-projected graphics. Just be careful to go with a quality unit, since some lower-cost projectors falsely claim ILDA compatibility when, at most, they might use the same style of connector. 

Patrick Murphy is executive director of the International Laser Display Association (ILDA), based in Orlando, Florida. Founded in 1986, ILDA is dedicated to advancing the use of laser displays in the fields of art, entertainment, and education. For more information, visit www.laserist.org.