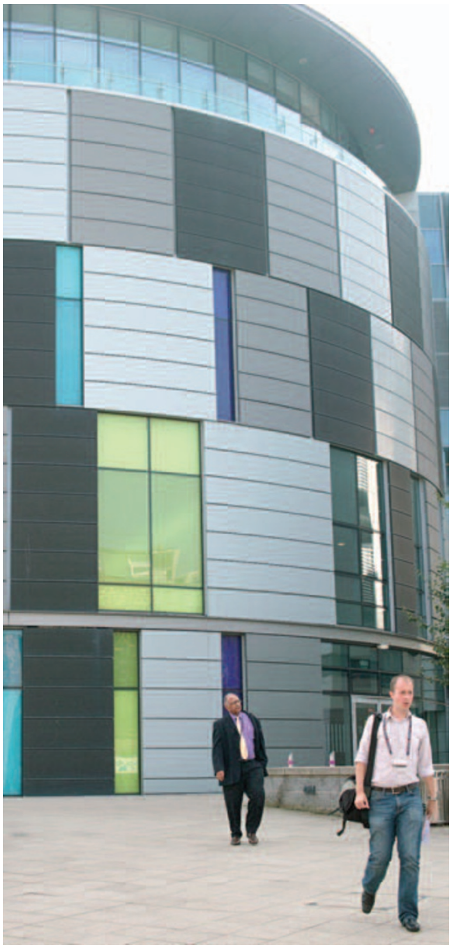
light." "We've been looking at coherent perfect absorption and transparency where one optical beam modulates another in a subwavelength-thick material," he told delegates. The team studied the interference of two counterpropagating red laser beams in a 50-nm gold film that is patterned with asymmetric split-ring structures and has a nominal transmission of 50%. A change in the phase or intensity of one beam changed the level of absorption or transparency of the other. Although the initial experiments were performed at a modulation rate of kilohertz and a wavelength of 633 nm, MacDonald says that the scheme could be engineered to work at any desired wavelength, including the telecommunications window around 1,550 nm, and in principle would be compatible with terahertz modulation speeds. He suggests that the approach could be used for an all-optical scheme for signal pulse recovery in an optical network where a coherent clock beam is used to clean up noisy signal pulses.

At a busy afternoon poster session, the topic of optical tweezing and trapping was well represented, with the Scottish universities of Dundee and Glasgow being especially prolific and presenting multiple results. Their findings included trapping using optical spirals containing angular momentum, red-blood-cell sorting and the use of holographic tweezers to manipulate metal nanoparticles. However, arguably the most visually striking poster was from Dundee's Craig McDonald and co-workers, who described how they had adapted Microsoft's Kinect gesture-based games console interface to holographic optical manipulation. Their HoloHands system allows a user to trap and manipulate multiple particles by using hand gestures in free space that are tracked and then applied to a holographic tweezer apparatus. McDonald's co-worker David McGloin explained how inspiration for the idea came from "playing around with [Nintendo] Wii games controllers" and that the team will be visiting local schools and the Aberdeen Techfest to demonstrate the system. A video of HoloHands in action can be found on YouTube (http://www.youtube.com/watch?v=I2iU90EiEis).

The biophotonics session also proved interesting, with two local talks from students from the University of Durham, the host of the conference, being particularly engaging. Kim Buttenschoen described work on using a confocal fluorescence microscope to track the passage of ophthalmic drugs that had been administered to the eye. "The scheme



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The Calman Learning Centre at the University of Durham, UK was the main venue for this year's Photon conference.

needs to be non-invasive, measurements need to be fast to avoid the blink reflex and it needs to be very sensitive as the drugs are only weakly fluorescent," explained Buttenschoen. "It also needs to be small, easy to use and work with low-power excitation light."

Buttenschoen said that the confocal instrument that the team has developed for the task had been tested with pig eyes *in vitro* and been shown to have a sensitivity of 1 nanomole per litre for the fluorescent dye fluorescein and to be able to detect fluorescent compounds with a quantum yield as low as 0.4%. As well as for tracking the location of fluorescent drugs, the instrument may also prove useful for monitoring the overall health of patients. The lens of eye is known to be autofluorescent (naturally self-fluorescent, without the need for any optically active compounds to be introduced), and the strength and characteristics of its fluorescence vary with age and can be an early indicator of diabetes. The hope is that in future the equipment could become a handheld instrument for a home-care monitoring system.

In the same session, Jonathan Taylor, also from Durham, reported an innovative approach for the three-dimensional imaging of the live, beating heart of a zebrafish embryo. "The challenge is that the heart is constantly beating, so how can we acquire a consistent set of image slices to create a meaningful three-dimensional construction," explained Taylor. "The answer is to make sure that each frame of the image is synchronized with the same point of the heart cycle."

The team achieve this synchronization by using a free-running monitor camera to capture bright-field images of the heart continuously at a high frame rate of 50–100 Hz. Images from this camera are analysed by a computer and used to predict when the heart will be in the correct point of its cycle. At that point, a laser to excite fluorescence is fired and, simultaneously, a second camera using a high-quantum-efficiency image sensor is used to collect a two-dimensional fluorescence image slice of the heart. By operating the scheme at stepped positions through the heart to collect a series of image slices, a complete, high-quality, three-dimensional image of the heart can be constructed. Although the technique is currently being applied for imaging purposes, Taylor says that it could also be useful for performing tasks such as laser ablation, where it "resolves the problem of hitting a moving target". He is now collaborating with scientists in Edinburgh on exploring that possibility.

Photon 12 was the sixth in the series of the highly successful Photon conferences, which have now been running for ten years. This latest event followed meetings in Southampton (2010), Edinburgh (2008), Manchester (2006), Glasgow (2004) and Cardiff (2002). The location of the next conference, in 2014, is yet to be announced. ❒

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**Correction**

In the News & Views entitled "All-optical spin-wave control" (*Nature Photon.* **6,** 643-645; 2012), the orange outline of Fig. 1 was incorrectly labeled as the path of pump pulsed laser beam when it should have been labeled as probe pulsed laser beam. This has now been corrected in the pdf and the html formats of the online version of this article.