Papers Published in Technical Journals and Conferences

Methane Detection in Ambient Air by Difference Frequency Generation Using a Direct-bonded Periodically Poled $LiNbO_3$ Ridge Waveguide

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IEEE LEOS, Vol. 06CH 37736C, No. TuG5, pp. 219–220, Oct. 2006.

Methane in ambient air is detected by difference frequency generation in a direct-bonded quasi-phase-matched $LiNbO_3$ ridge waveguide using near infrared communication band laser diodes as pump and signal sources. Absorption lines for 0 brance in the 3.3 μm n3 band are measured by using a Hanst configuration multipass cell with scan of a signal external cavity laser diode by suppressing various spectroscopic fringes and stabilizing the pump laser diode osccilation mode with a fiber Bragg grating.

Interface Microstructure of MgB_2/Al–AlO_x/MgB_2 Josephson Junctions Studied by Cross-sectional Transmission Electron Microscopy

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Jpn. J. Appl. Phys. , Vol. 46, No. 12, pp. L271–L273, Mar. 2007.

We investigated the interface microstructure of sandwich-type MgB_2/Al–AlO_x/MgB_2 Josephson tunnel junctions by cross-sectional transmission electron microscopy (TEM) in order to clarify the non-idealities in the junction characteristics. The results indicate that there are poor-crystalline MgB_2 layers and/or amorphous Mg–B composite layers of a few nanometers between the AlO_x barrier and upper MgB_2 layer. The poor-crystalline upper Mg–B layers seem to behave as normal metal or deteriorated superconducting layers, which may be the principal reason for all non-idealities of our MgB_2/Al–AlO_x/MgB_2 junctions.

Human Visual System Integrates Color Signals along a Motion Trajectory

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Current Biology, Cell Press, Vol. 17, No. 4, pp. 366–372, Feb. 2007.

Whether fundamental visual attributes, such as color, motion, and shape, are analyzed separately in specialized pathways has been one of the central questions of visual neuroscience [1–3]. Although recent studies have revealed various forms of cross-attribute interactions, including significant contributions of color signals to motion processing [4–9], it is still widely believed that color perception is relatively independent of motion processing. Here, we report a new color illusion, motion-induced color mixing, in which moving bars, the color of each of which alternates between two colors (e.g., red and green), are perceived as the mixed color (e.g., yellow) even though the two colors are never superimposed on the retina. The magnitude of color mixture is significantly stronger than that expected from direction-insensitive spatial integration of color signals [10, 11]. This illusion cannot be ascribed to optical image blurs, including those induced by chromatic aberration [12, 13], or to involuntary eye movements of the observer. Our findings indicate that color signals are integrated not only at the same retinal location, but also along a motion trajectory. It is possible that this neural mechanism helps us to see veridical colors for moving objects by reducing motion blur, as in the case of luminance-based pattern perception [14–19].

Two Mechanisms Underlying the Effect of Angle of Motion Direction Change on Colour-motion Asynchrony

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Vision Res, Elsevier, Vol. 47, No. 5, pp. 687–705, Mar. 2007.

Under appropriate stimulus conditions, judgments about the degree of temporal synchrony in sequences containing rapid alternations of colour and motion direction imply a large apparent delay of motion perception relative to colour perception. Whether this colour-motion asynchrony results from the relative processing delay of different visual attributes, or from inappropriate matching of time markers assigned to first-order change of colour and position has been the subject of recent debate. Colour-motion asynchrony is significantly weakened when the angle of direction change is reduced from 180° (direction reversal) to a smaller change in direction. Although this finding has been interpreted to favour the processing delay hypothesis, here we show that it is consistent with the time marker account. First, the reported dependence on the motion direction angle was particularly strong for random-dot stimuli, but our results indicate that this may reflect the introduction of an artefact, motion streaks, that allows subjects to make a colour-orientation synchrony judgement rather than a colour-motion synchrony judgment for direction change angles other than 180°. Second, when we used streak-free plaid stimuli, a certain amount of angle dependence remained regardless of whether we asked the observers to judge the apparent binding or synchrony of colour and motion direction changes. The degree of direction change also affected reaction times, but the effect of apparent asynchrony for a direct comparison of sequences of 90° and 180° motion direction changes was very small, if at all present. These findings with plaid stimuli are consistent with the time marker account; in that we allow that the direction change angle can affect the time course of the recruitment of neural responses to the new direction of motion, which will have a consequential effect on the temporal location of salient features in the sequence of motion changes.
