# Article information:

Sideband-free space–time-coding metasurface antennas | Nature Electronics  
<https://www-nature-com.ezproxy.cityu.edu.hk/articles/s41928-022-00857-0>

# Article summary:

1. Metasurfaces can manipulate electromagnetic waves and offer distinct advantages over metamaterials such as low insertion loss, easy fabrication, and conformability.

2. Spatiotemporally modulated metasurfaces (STMMs) have one or more spatially and temporally variant parameters, enabling a wide variety of functions including abnormal deflection, orbital angular momentum generation, holography, cloaking, and direct information modulation.

3. Metasurface antennas bridge the gap between waveguides and free space and have potential applications in microwave wireless communications, optical light fidelity, and light detection and ranging systems. However, sideband pollution is a key bottleneck in the broad application of STMMs.

# Article rating:

Appears moderately imbalanced: The article provides some useful information, but is missing several important points or pieces of evidence that would be required to present the discussed topics in a balanced and reliable way. You are encouraged to seek a more balanced perspective on the presented issues by exploring the provided research topics and looking at different information sources.

# Article analysis:

The article titled "Sideband-free space-time-coding metasurface antennas" published in Nature Electronics discusses the potential of spatiotemporally modulated metasurfaces (STMMs) for manipulating electromagnetic waves. The article provides a detailed overview of the different types of STMMs and their potential applications, including microwave wireless communications, optical light fidelity, and light detection and ranging systems.

The article is well-written and informative, providing readers with a comprehensive understanding of STMMs. However, there are some potential biases and missing points of consideration that should be noted.

One potential bias is the lack of discussion on the limitations and challenges associated with STMMs. While the article highlights the advantages of STMMs over traditional metamaterials, it does not provide a balanced view by discussing their limitations or potential risks. For example, there may be challenges associated with integrating tunable components into metasurfaces or ensuring reliable performance in real-world environments.

Additionally, the article focuses primarily on the potential benefits of STMMs without exploring counterarguments or alternative viewpoints. For example, while phased arrays are mentioned as an alternative to metasurface antennas for beamforming and steering at microwave frequencies, there is no discussion on their potential advantages or disadvantages compared to STMMs.

Furthermore, the article includes some unsupported claims and promotional content. For instance, it states that metasurfaces offer powerful opportunities to bridge the gap between waveguides and free space but does not provide evidence to support this claim. Additionally, while the article mentions that sideband pollution is a key bottleneck in the broad application of STMMs, it does not provide evidence to support this claim or discuss potential solutions.

Overall, while the article provides valuable insights into STMMs' potential applications and benefits for manipulating electromagnetic waves, it could benefit from more balanced reporting that considers both sides equally. Additionally, more evidence-based claims would strengthen its credibility and provide readers with a more comprehensive understanding of the topic.

# Topics for further research:

* Limitations of spatiotemporally modulated metasurfaces
* Challenges of integrating tunable components into metasurfaces
* Reliability of spatiotemporally modulated metasurfaces in real-world environments
* Advantages and disadvantages of phased arrays compared to metasurface antennas
* Evidence supporting the claim that metasurfaces bridge the gap between waveguides and free space
* Solutions to sideband pollution in spatiotemporally modulated metasurfaces

# Report location:

<https://www.fullpicture.app/item/1d0c7fdea39dcee739335daa7b919e63>