
"Ecoutez" les chos lumineux dun trou noir

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Une nouvelle sonification transforme les "échos lumineux" des rayons X d'un trou noir en son. Des anneaux de rayons X vus par les observatoires Chandra et Swift de la NASA montrent les échos. La matière autour d'un trou noir peut générer des rafales de rayons X. Les rayons X se reflètent sur les nuages de gaz et de poussière comme les faisceaux des phares peuvent le faire dans le brouillard.

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L'une des caractéristiques surprenantes des trous noirs est que bien que la lumière (telle que la radio, le visible et les rayons X) ne puisse pas s'en échapper, la matière environnante peut produire d'intenses rafales de rayonnement électromagnétique. Lorsqu'ils se déplacent vers l'extérieur, ces explosions de lumière peuvent rebondir sur des nuages de gaz et de poussière dans l'espace, de la même manière que les faisceaux lumineux d'un phare de voiture se dispersent sur le brouillard.

Une nouvelle sonification transforme ces « échos lumineux » du trou noir appelé V404 Cygni en son. Situé à environ 7 800 années-lumière de la Terre, V404 Cygni est un système qui contient un trou noir, d'une masse comprise entre cinq et 10 fois celle du Soleil, qui tire de la matière d'une étoile compagne en orbite autour de lui. Le matériau est canalisé dans un disque qui encercle le trou noir de masse stellaire.

Ce matériau génère périodiquement des rafales de rayonnement, y compris des rayons X. Au fur et à mesure que les rayons X se déplacent vers l'extérieur, ils rencontrent des nuages de gaz et de poussière entre V404 Cygni et la Terre et sont dispersés sous différents angles. L'observatoire de rayons X Chandra de la NASA et l'observatoire Neil Gehrels Swift ont imagé les échos de rayons X autour de V404 Cygni. Parce que les astronomes savent exactement à quelle vitesse la lumière se déplace et ont déterminé une distance précise par rapport à ce système, ils peuvent calculer quand ces éruptions se sont produites. Ces données, ainsi que d'autres informations, aident les astronomes à en savoir plus sur les nuages de poussière, y compris leur composition et leurs distances.

La sonification de V404 Cygni traduit les données de rayons X de Chandra et Swift en son. Pendant la sonification, le curseur se déplace vers l'extérieur du centre de l'image dans un cercle. Lorsqu'il passe à travers les échos lumineux détectés dans les rayons X (vus comme des anneaux concentriques en bleu par Chandra et en rouge par Swift dans l'image), il y a des sons semblables à des tiques et des changements de volume pour indiquer la détection des rayons X et les variations de luminosité. Pour différencier les données des deux télescopes, les données Chandra sont représentées par des tonalités à haute

fréquence tandis que les données Swift sont plus basses. En plus des rayons X, l'image comprend des données optiques du Digitized Sky Survey qui montre les étoiles d'arrière-plan. Chaque étoile en lumière optique déclenche une note de musique. Le volume et la hauteur de la note sont déterminés par la luminosité de l'étoile.

Plus de sonifications de données astronomiques, ainsi que des informations supplémentaires sur le processus, peuvent être trouvées sur le site Web "A Universe of Sound": <https://chandra.si.edu/sound/>

Ces sonifications ont été dirigées par le Chandra X-ray Center (CXC) et incluses dans le cadre du programme Universe of Learning (UoL) de la NASA. La collaboration a été menée par la scientifique en visualisation Kimberly Arcand (CXC), l'astrophysicien Matt Russo et le musicien Andrew Santaguida (tous deux du projet SYSTEM Sounds). Le Marshall Space Flight Center de la NASA gère le programme Chandra. Le centre de rayons X Chandra du Smithsonian Astrophysical Observatory contrôle la science depuis Cambridge, Massachusetts, et les opérations aériennes depuis Burlington, Massachusetts. Le matériel Universe of Learning de la NASA est basé sur des travaux soutenus par la NASA dans le cadre de l'accord de coopération numéro NNX16AC65A avec le Space Telescope Science Institute, en partenariat avec Caltech / IPAC, Center for Astrophysics | Harvard & Smithsonian, et le Jet Propulsion Laboratory.

Be found - Be connected

Digital marketing refers to any marketing activity that uses digital channels to promote a product, service, or brand. Digital channels include search engines, social media platforms, email, mobile apps, websites, and other digital media. Digital marketing is important because more and more people are spending time online, and businesses need to reach their target audience where they are spending their time.

These are just a few examples of digital marketing strategies. The key to a successful digital marketing campaign is to identify your target audience, select the right channels, create valuable content, and track and measure your results to continually improve your strategy.

SEO

SEO, or search engine optimization, is a digital marketing strategy that involves optimizing your website and its content to rank higher in search engine results pages (SERPs) and drive more organic traffic to your site. The goal of SEO is to make it easier for search engines like Google to understand what your website is about and to provide valuable and relevant content



to users who are searching for information related to your business or industry.

SEO is an ongoing process that requires continuous monitoring, tracking, and optimization to achieve and maintain high search engine rankings. It's also important to keep up-to-date with the latest SEO best practices and algorithm updates to ensure that your website stays ahead of the competition.

PPC, or pay-per-click advertising

PPC, or pay-per-click advertising, is a digital marketing strategy that involves placing ads on search engine results pages (SERPs) or social media platforms and paying for each click on the ad. PPC ads are typically shown at the top or bottom of search engine results pages, or within social media feeds, and they are marked as ads to differentiate them from organic search results.

PPC advertising works on an auction system, where advertisers bid on the keywords and phrases they want to target, and the ad platform (such as Google Ads or Facebook Ads) selects the winning ad to display based on a variety of factors, including bid amount, ad quality, relevance, and other factors.

PPC ads can be highly targeted, allowing businesses to reach specific audiences based on demographics, interests, behaviors, and other factors. They can also be optimized for specific goals, such as driving website traffic, generating leads, or increasing sales.

PPC advertising can be complex and requires ongoing monitoring and optimization to achieve the best results. It's important to have a clear strategy, set realistic goals, and continually test and refine your campaigns to ensure they are delivering the best possible results.

Social media marketing

Social media marketing is a digital marketing strategy that involves using social media platforms like Facebook, Instagram, Twitter, LinkedIn, and others to build brand awareness, engage with customers, and drive traffic to your website.

Social media marketing typically involves creating and sharing content, such as images, videos, and text-based posts, that are designed to engage and entertain your audience, promote your products or services, and build brand loyalty. Social media marketing also involves interacting with your followers and responding to their comments and messages.

To be successful in social media marketing, it's important to have a clear strategy, set measurable goals, and consistently create and share high-quality content that resonates with your target audience. It's also important to track and measure your results and continually refine your approach to ensure you are achieving the best possible outcomes.

Email marketing

Email marketing is a digital marketing strategy that involves sending targeted emails to your subscribers or customers to promote your products or services, build relationships, and drive conversions. Email marketing can take many forms, including newsletters, promotional emails, product updates, and more.

To be successful in email marketing, it's important to have a clear strategy and set measurable goals. This involves building a quality email list of subscribers who have opted-in to receive emails from your business, creating engaging content that resonates with your audience, and consistently testing and optimizing your campaigns to achieve the best results.

It's also important to comply with email marketing regulations, such as the CAN-SPAM Act, by including clear opt-out links and contact information in your emails and avoiding misleading or spammy messaging.

Content marketing

Content marketing is a digital marketing strategy that involves creating and sharing valuable, relevant, and consistent content to attract and retain a clearly defined audience, with the goal of driving profitable customer action.

Content marketing can take many forms, including blog posts, videos, infographics, podcasts, social media posts, and more. The key is to create content that provides value to your target audience and aligns with your business objectives.

To be successful in content marketing, it's important to have a clear strategy and set measurable goals. This involves identifying your target audience, understanding their needs and interests, and creating content that aligns with their preferences and expectations.

It's also important to consistently create and share high-quality content that is optimized for search engines and promoted through social media and other channels. This involves creating a content calendar, conducting keyword research, and leveraging analytics and other tools to track and measure your results and continually refine your approach.

Affiliate marketing

Affiliate marketing is a digital marketing strategy where a business partners with an affiliate or publisher to promote its products or services in exchange for a commission on sales or leads generated through the affiliate's efforts. This means that the affiliate promotes the business's products or services on their website or other digital channels and earns a commission for each sale or lead that they refer.

To be successful in affiliate marketing, it's important to choose the right affiliates and build strong relationships with them. This involves identifying affiliates who are a good fit for your business and who have an audience that aligns with your target market.

It's also important to provide affiliates with high-quality promotional materials, such as banner ads and product descriptions, and to track and measure the results of your affiliate marketing campaigns to continually refine your approach and optimize your results. Additionally, it's important to comply with relevant laws and regulations, such as the Federal Trade Commission's guidelines on endorsements and testimonials.

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For more details, please visit <https://www.bleu7.com/detail/nasa-s-james-webb-space-telescope-new-paris-35>
