

● POLITY

● ECONOMICS

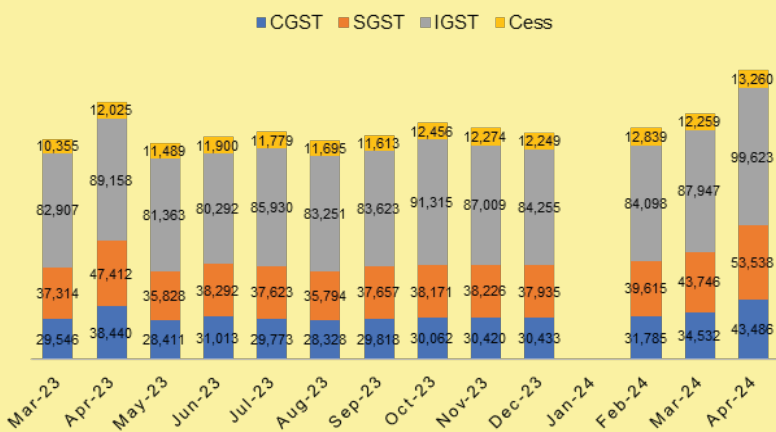
● TECHNOLOGY

● ECOLOGY

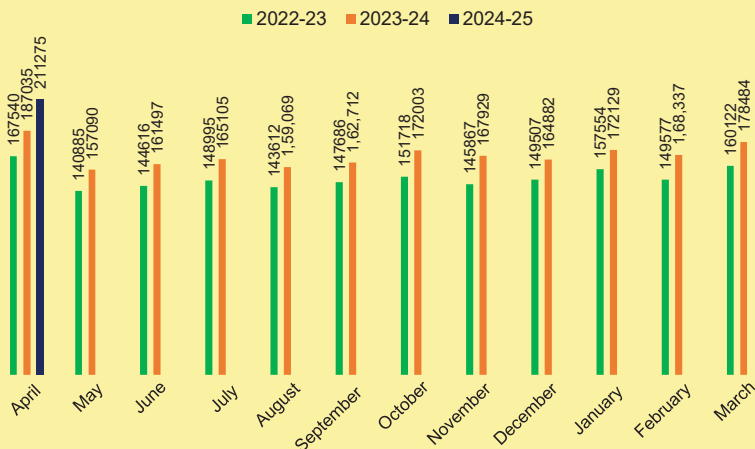
**ECONOMICS AND DEVELOPMENT**

## April's gross GST takings power past ₹2.1 lakh cr. in new record

**CONTEXT:** The Goods and Services Tax (GST) revenue collections in April recorded ₹ 2.1 lakh Cr., reflecting a Year on Year (Y-o-Y) growth rate of 12.4 % over the previous highest tally of ₹ 1.87 lakh Cr. in the same month last year. The Goods and Services Tax (GST) revenues for April, 2024 was ₹1.92 lakh Cr., 15.5 % higher than the collection in April 2023, taking refunds into account.



**FIGURE:** Column chart representation of components of GST receipts (Cr.) (on Y-o-Y basis)



**FIGURE:** Column chart representation of Goods & Services Tax (GST) receipts (Cr.) (on Y-o-Y basis).

In April, GST revenues, usually the highest in a year due to taxpayers settling their accounts for the financial year, are expected to moderate after a record spike last month. Despite this moderation, experts anticipate some growth over the monthly average GST collection of ₹ 1.68 lakh Cr. in 2023-24. This follows a rebound in goods imports revenues, which had contracted 5 % in March, and a slowdown in domestic transactions' growth compared to the previous month's 17.6 % increase. While gross GST revenues grew at a slower pace of 11.5 % in March, net revenues

rose 18.4 %, faster than April's growth.

GST compensation cess collections levied on select goods such as automobiles and tobacco products, over and above the peak GST rate of 28 % also hit an all-time high of ₹ 13,260 Cr. last month, which included ₹ 1,008 Cr. collected on imported goods. The cess, initially introduced for five years to compensate States for revenue losses arising from the 2017 switch to the GST regime, is now being used to repay loans taken during the pandemic to recompense States amid a lockdown-triggered collapse in revenues.

Four States, including the erstwhile State of Jammu and Kashmir, Arunachal Pradesh, and Sikkim, recorded a contraction in revenues last month. Eight States saw muted growth relative to the 13.4 % overall growth in domestic revenues, with Jharkhand (3 %), Uttarakhand (4 %), and Tamil Nadu (6 %) seeing the weakest growth.

**POLITY AND GOVERNANCE**

## SC rejects plea for allocating spectrum without auction

**CONTEXT:** The Supreme Court declined to receive an application by the Centre to allow the administrative allocation of spectrum after the Registrar found the application for clarification misconceived. The Union Government filed an application citing spectrum assigned not only for commercial telecom services but also for discharge of sovereign and public interest functions.

The Supreme Court in the 2G spectrum judgment laid down a law for allocation of spectrum, a scarce natural resource to private players only through open, transparent auction. 'Administrative allocation' of spectrum would have government in sole charge of selecting operators to distribute airwaves. The February 2012 judgment in the 2G spectrum case held that "for alienation of scarce natural resources like spectrum, etc, the state must always adopt a method of auction by giving wide publicity so that all eligible persons may participate in the process".

The Registrar invoked Order XV Rule 5 of the Supreme Court Rules, 2013 to decline the application. Under this provision of the 2013 Rules, the Registrar may refuse to receive a petition on the ground that it discloses no reasonable cause or is frivolous or contains scandalous matter. The government has 15 days to appeal to the court.



## SCIENCE AND TECHNOLOGY

## ISRO finds proof of enhanced possibility of water ice in polar craters of the moon

**CONTEXT:** Scientists of ISRO's Space Applications Centre (SAC) in collaboration with researchers of IIT Kanpur, University of Southern California, Jet Propulsion Laboratory and IIT (ISM) Dhanbad found evidence of enhanced possibility of water ice occurrence in the polar craters of the moon.

The sub-surface ice in the first couple of metres is about five to eight times larger than the one on the surface in both poles. The extent of water ice in the northern polar region is twice that in the southern polar region. The primary source of sub-surface water ice in the lunar poles is out-gassing during volcanism in the Imbrian period. As such, drilling on the moon to sample or excavate that ice will be primordial for future missions and long-term human presence. The distribution of water ice is likely governed by mare volcanism and preferential impact cratering.

Accurate knowledge of the distribution and depth of water ice occurrence in the lunar poles, as presented in the investigation, is crucial for constraining the uncertainties in selecting future landing and sampling sites for missions aimed at exploring and characterising lunar volatiles. This study is crucial for supporting ISRO's future in-situ volatile exploration plans on the moon.

## SCIENCE AND TECHNOLOGY

## IIA releases video of the moon occulting brightest star Antares

**CONTEXT:** Bengaluru-based Indian Institute of Astrophysics (IIA) has filmed the passing of the moon in front of Antares, a bright red star from its Bengaluru campus using a camera on an eight-inch telescope. As seen from Bengaluru, Antares disappeared behind the bright side of the gibbous moon around 1.13 a.m. and reappeared at the darker side around 1.53 a.m.

The moon passed in front of Antares on April 27, hiding it for roughly 40 minutes was visible only from southern India. The moon, while moving in its orbit roughly once a month will occasionally occult, or hide, bright stars that are behind, and sometimes, even planets. This happens now and then for the star Antares (Jyeshtha), which is the brightest star in the constellation of Scorpius. Since the moon is relatively close to the Earth, such occultations will be visible only from some locations on the globe. The last such occultation of Antares, which was visible from India, was on February 5 this year. The next one will be in June 2027.

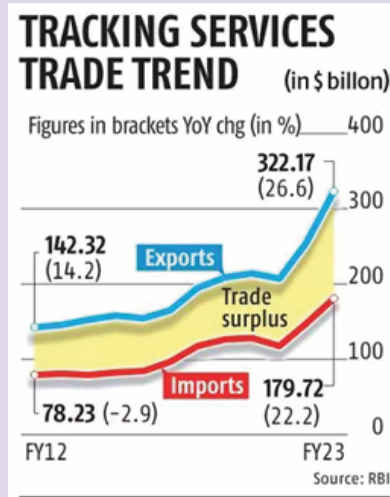
## ECONOMICS AND DEVELOPMENT

## The services story

**CONTEXT:** Global investment banking major Goldman Sachs, titled 'India's rise as the emerging services factory of the world', has captured India's recent success in providing global services and sought to forecast growth prospects and risks in the medium term.

India's services exports over the last 18 years, including professional consulting, that have grown the fastest, travel services which have grown the slowest, and financial services that could gain if initiatives such as the GIFT City click.

Global services exports tripled over 18 years, while services exports from India grew at twice the pace to reach nearly \$ 340 billion last year. In fact, its exports growth has been the third fastest globally since 2005, behind Singapore and Ireland. The country's share in global services outflows has risen from under 2 % in 2005 to 4.6 % in 2023. India's share in goods exports increased from 1 % to 1.8 % during this period.



Goldman Sachs project services exports to \$ 800 billion by 2030, while slightly lower than the government's target of \$ 1 trillion by 2030 for both services and merchandise exports, a continuing uptick in high-value services would also drive top-end discretionary consumption and real estate demand, the firm reckoned. In the immediate term, the outlook is tentative as top firms in IT services, still India's most

dominant export segment, have shed employees over the past year and their growth guidance for this year is far from bullish.

The services trade boom also served as an invaluable cushion for India's external account balances against shocks such as pricey oil imports. A protectionist tendency in destination countries could hurt exports, just as irrational domestic policy interventions such as attempts to "manage" IT hardware imports. India needs a calibrated approach to sustain the services success story. A hard push for global market access and opportunities for all professional services, as well as a light-touch regulatory approach to let new ideas and enterprises bloom across areas such as artificial intelligence, manufacturing-linked services, and blockchain applications.



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## ECONOMICS AND DEVELOPMENT

## DGCA deregisters all 54 Go First aircraft

**CONTEXT:** The Directorate General of Civil Aviation (DGCA) on Wednesday deregistered all 54 Go First aircraft following a Delhi High Court order last week, in which the court had given the country's aviation regulator five days to do so.

### End of the runway

DGCA deregisters all 54 planes in Go Air's fleet after Delhi High Court orders regulator to act following a plea by aircraft lessors



- HC allowed lessors to inspect the planes and undertake maintenance of their aircraft

- Lessors including SMBC Aviation Capital, ACG Aircraft Leasing and China Development Bank Financial Leasing moved court

- Uncertainty over who will bear the parking charges owed to Airports Authority of India

A total of 14 aircraft lessors including SMBC Aviation Capital Limited, Sky Leasing, GY Aviation Lease, ACG Aircraft Leasing, BOC Aviation and China Development Bank Financial Leasing Company had moved the Delhi High Court last year seeking to regain control over the airline's fleet of leased planes. The National Company Law Tribunal on May 10, 2023 admitted Go First's plea for voluntary insolvency and the consequential moratorium to protect the airline from adverse actions by its creditors.

### Allows maintenance

Last week, the Delhi High Court directed the DGCA to "forthwith and no later than the next five working days process the Deregistration Applications", as well as facilitate their "export by providing an Export Certificate of Airworthiness, a Ferry Flight Permit and all other documents and permissions as the Petitioners/Lessors may require". The court had also allowed lessors to inspect the aircraft and undertake maintenance of the planes.

The Delhi High Court had asked the Airports Authority of India to inform the DGCA of the parking charges owed, it was not clear whether these dues would have to be paid by the lessors or the Resolution Professional overseeing Go Air's affairs during the insolvency process.

## GEOGRAPHY

## Sea also rises

**CONTEXT:** Scientists at the Indian Institute of Tropical Meteorology, Pune, and other international institutions has forecast — based on expected global carbon emission trends — the likely impact on the Indian Ocean.

The Indian Ocean warmed 1.20 C and will likely heat up 1.70 C - 3.80 C from 2020 to 2100. The 'marine heatwaves', linked to the rapid formation of cyclones is likely to increase tenfold from the current average of 20 days per year to 220–250 days per year. This will push the tropical Indian Ocean into a "near-permanent heatwave state", accelerate coral bleaching and harm the fisheries sector.

The heating of the ocean would not be merely confined to the surface but actually increase the heat content of the ocean. When measured from the surface to 2,000 meters below, the thermal capacity of this ocean is now rising at the rate of 4.5 zetta-joules per decade, and is predicted to increase at a rate of 16–22 zetta-joules per decade in the future. Joule is a unit of energy and 1 zetta joule is a billion-trillion joules (10<sup>21</sup>).

The consequences of a warming Indian Ocean are indeed significant for mainland India. Here's a breakdown of some of the key impacts:

1. **Increased Frequency of Severe Cyclones:** A warmer Indian Ocean provides more energy for cyclone formation and intensification. This can lead to an increase in the frequency and intensity of severe cyclonic storms, like the ones that hit coastal areas of India, causing widespread damage and loss of life.
2. **Erratic Monsoon Patterns:** The warming of the Indian Ocean can disrupt the normal monsoon patterns over India. This can result in longer spells of drought in some regions followed by intense rainfall and flooding in others, leading to challenges in water management and agriculture.
3. **Droughts and Floods:** The erratic monsoon patterns can lead to more frequent and severe droughts in some parts of India, impacting agriculture and water availability. On the other hand, intense rainfall can lead to flooding, causing damage to crops, infrastructure, and displacement of populations.
4. **Anthropogenic Contribution:** While natural climate variability plays a role in these changes, human activities, especially the burning of fossil fuels, release greenhouse gases into the atmosphere, leading to global warming. This, in turn, contributes to the warming of the Indian Ocean and exacerbates these extreme weather events.

Addressing these challenges requires concerted efforts to mitigate climate change through reducing greenhouse gas emissions and adapting to the changing climate by implementing sustainable water management practices, resilient infrastructure, and disaster preparedness measures.

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—Benjamin Franklin

POLITY AND GOVERNANCE

# Budgets and Bills passed with little deliberation

(a) In 2023, of the ₹ 18.5 lakh Cr. budget presented by 10 States, approximately 40 % was passed without discussion. In five States, the Public Accounts Committee (PAC) did not table any reports in the year considered. Moreover, five State legislatures passed all Bills on the day they were introduced or the next day. However, in 10 States for which data was available, 36 % of the expenditure demands were voted on and passed without being discussed. Madhya Pradesh passed 85% of its ₹3.14 lakh crore Budget without discussion, the highest among the ten States. Kerala came second with 78 %, followed by Jharkhand (75 %) and West Bengal (74 %).

(b) In 2023, the Public Accounts Committee (PAC) held 24 sittings and tabled 16 reports on average in the States considered. In five of the 13 States for which data was available — Bihar, Delhi, Goa, Maharashtra and Odisha — the PAC did not table any reports. Alarming, the PAC in Maharashtra neither met nor released a report during the year. In contrast, the PAC in Tamil Nadu tabled 95 reports followed by Himachal Pradesh where the committee tabled 75 reports. Both Uttar Pradesh and Bihar had 50 sittings or more by the PAC though not a single report was tabled in the latter.

(c) In fact, 44% of the Bills were passed either on the same day they were introduced in the Assembly or the next day. The figure is consistent with the trend observed in 2022 (56%) and 2021 (44%). In Gujarat, Jharkhand, Mizoram, Puducherry, and Punjab, all Bills were passed on the day of introduction or the next day. In 13 of 28 State legislatures, Bills were passed within five days of introduction. Kerala and Meghalaya took more than five days to pass

more than 90% of their Bills. About 55% of Bills in Rajasthan were also passed after more than five days of deliberation.

(d) 84 ordinances were promulgated in 20 States covering a range of subjects including, new universities (Uttar Pradesh), public examinations (Uttarakhand), and ownership of apartments (Maharashtra). The highest number of ordinances was promulgated by Uttar Pradesh (20), followed by Andhra Pradesh (11), and Maharashtra (9). In 2023, only four Ordinances were promulgated in Kerala, compared to 15 in 2022, and 144 in 2021.

## State of affairs

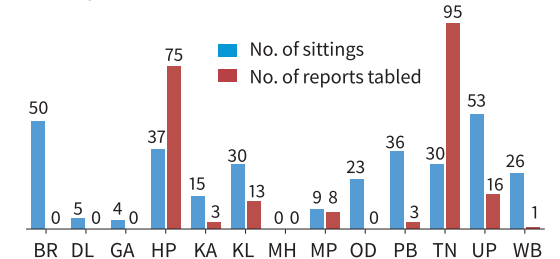
The data for the charts were sourced from PRS Legislative Research's Annual Review of State Laws 2023



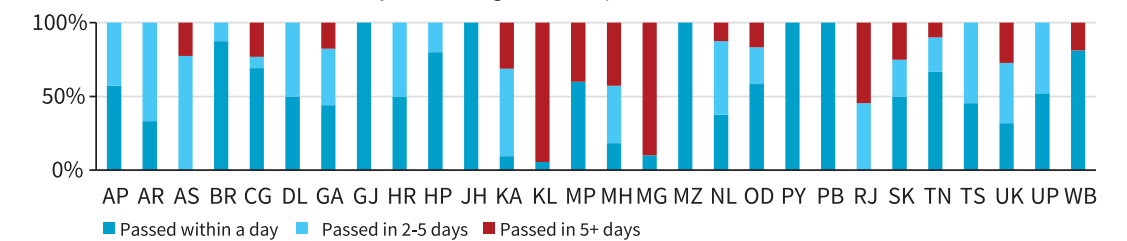
**Chart 1:** The chart shows the proportion of the Budget passed without discussion in 10 States in 2023. Figures in %



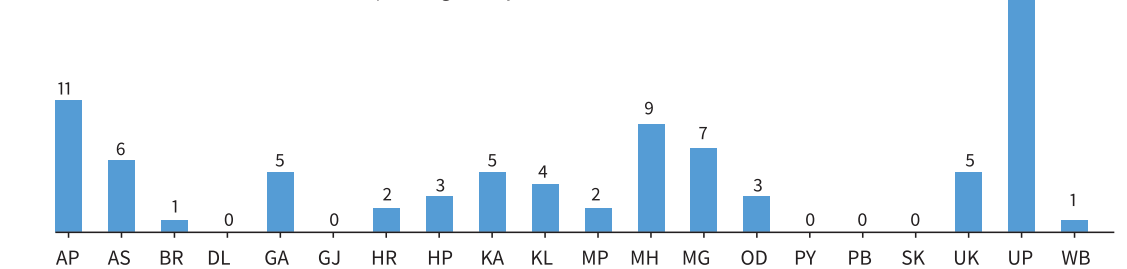
**Chart 2:** The chart shows the number of sittings and reports tabled by the PAC in 2023



**Chart 3:** The chart shows the time taken by the State legislatures to pass Bills in 2023



**Chart 4:** The chart shows the Ordinances promulgated by States in 2023



Andhra Pradesh: AP, Jharkhand: JH, Puducherry: PY, Karnataka: KA, Punjab: PB, Assam: AS, Kerala: KL, Rajasthan: RJ, Bihar: BR, Madhya Pradesh: MP, Sikkim: SK, Chhattisgarh: CG, Maharashtra: MH, Tamil Nadu: TN, Delhi: DL, Telangana: TS, Goa: GA, Meghalaya: MG, Gujarat: GJ, Mizoram: MZ, Uttarakhand: UK, Haryana: HR, Nagaland: NL, Uttar Pradesh: UP, Himachal Pradesh: HP, Odisha: OD, West Bengal: WB

## SCIENCE AND TECHNOLOGY

## Particles called quarks hold the key to the final fate of some stars

Quarks, that can't exist in isolation can only be found in groups of two or three, calling clumps of quarks are called hadrons. Physicists have mostly studied quarks based on the behaviour of hadrons, and are also interested in how quarks clump together. Physicists have been able to obtain evidence of a state of matter called a quark-gluon plasma exists for a brief moment smashing lead ions against each other at very high energies in machines like the Large Hadron Collider. This clumping process may release energy or modify its surroundings in a way that astrophysicists can look for, and eventually discover a quark star.

### When quarks clump

Physicist Murray Gell-Mann, named these particles after a line in James Joyce's 1939 masterpiece, *Finnegan's Wake*. A three-quark clump is more likely to form than two-quark clump when a particular type of quark is more densely surrounded by some other particles. The finding rejects "conventional particle-physics models in which the consolidation of quarks is independent of the particle environment". Protons and neutrons are clumps of lighter quarks and are thus more long-lived. Heavy-quark clumps are very short-lived and harder to study, requiring more sophisticated tools and computing power.

### The tension of every star

The force of gravity — arising from the star's mass — encourages the star to collapse under its own weight and implode. The nuclear force, expressed in the explosive energy released by fusion reactions at its core, pushes the star to blow up and outwards. But once a star runs out of material to fuse, nuclear fusion weakens and gravity starts to gain the upper hand. Eventually, the star will 'die' and implode. Its fate in its afterlife depends on how large and massive it was when it lived, as a result forming a white dwarf, a neutron star or a black hole.

Scientists have estimated that if the Sun were 20-times more massive, it may collapse into a black hole when it dies. If it were only eight-times heavier, it could become a neutron star. But could there be stars that are too heavy to form a neutron star yet not too heavy to form a black hole, and thus form a quark star.

### Enter 'quark matter'

In neutron stars, the strength with which the core collapses will fuse all protons and electrons inside into neutrons. The matter inside neutron stars is extremely dense. For example, two Suns' worth of mass is packed into a sphere only 25 km wide. This creates an immense pressure that could be forcing the neutrons into a new state of matter. Most massive neutron stars have an 80-90% chance of being made of quark matter.

The research team combined astrophysical observations with theoretical ab initio (from scratch) calculations to develop a model that they ran using a supercomputer, and arrived at this result. However, these astrophysical observations were small in number, meaning the result is not so reliable. Astrophysicists need more observational data to understand quark matter and how exactly it forms.

### The need for quarks

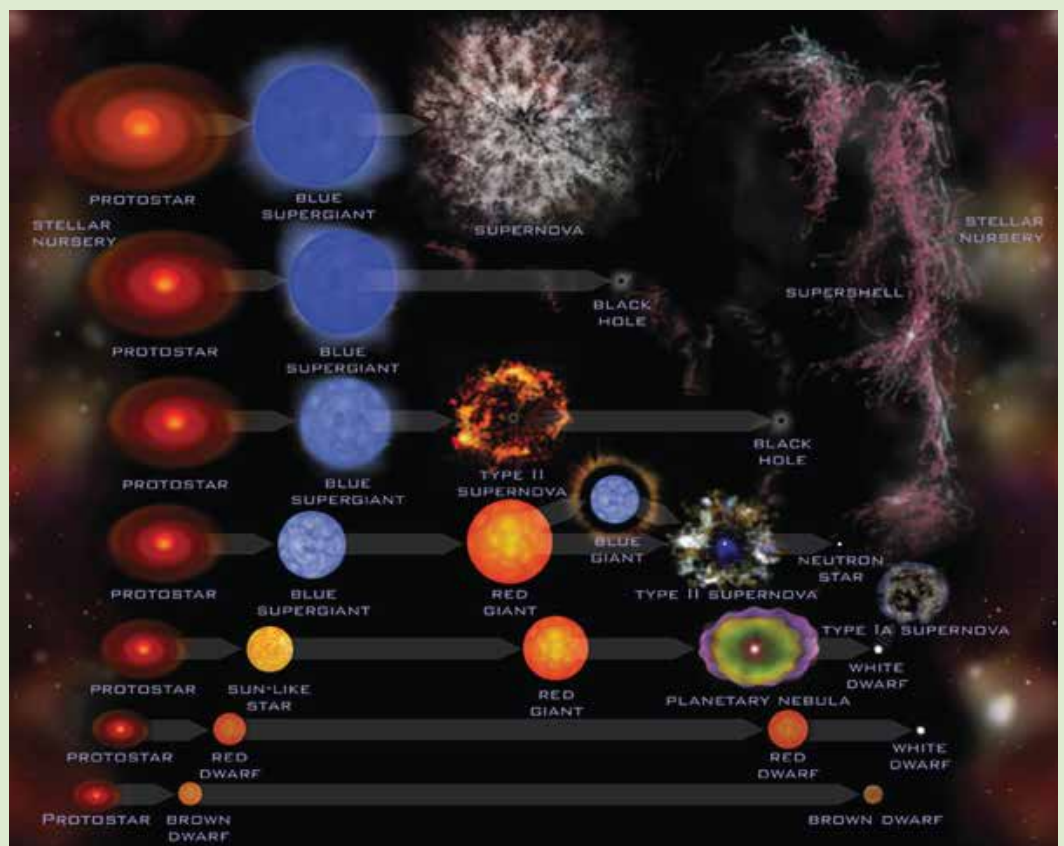
A popular way of calculating the bulk properties of any material is to use an Tolman-Oppenheimer-Volkoff equation of state: very complex but it assigns a probability to the presence of quarks within neutron stars.

Physics has a rich tradition of giving quirky names to things physicists find. For example, quarks come in six 'flavours' — three are called charm and strange; quarks themselves have a property called colour charge; and so on.

### Setting quarks free

There are six types of quarks: up, down, top, bottom, strange, and charm. Each quark can have one of three types of colour charge. Then there are also antiquarks, their antimatter versions. A quark-antiquark clump is called a meson (they don't annihilate each other because they are of different types, eg. up + anti-down). Three-quark clumps are called baryons and they form the normal matter surrounding us.

Quarks are further held together by another set of particles called gluons. Because nuclear forces are very strong, quarks are always tightly bound to each other and are not free, even in the vacuum of empty space. The nuclear force that holds quarks together is explained by a theory called quantum chromodynamics. It predicts that at sufficiently high (by all means extreme) energies, nuclear matter can become 'deconfined' to create a new phase of matter in which quarks don't have to exist in clumps.





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