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| **TOPIC** | **Positives** | **Negatives** | **SCORE** |
| 1.Machine learning astronomy | * Accelerated discoveries – leading to indirect benefits. * More efficiency and improved research allocation. | * Job displacement * Potential for misinformation from AI – hindering scientific discovery. | 50 |
| 2.Early galaxy formation | * Tech advancement * Long-term human survival * Fuels curiosity | * Little short-term benefits * Ethics of exploration – disrupting extra-terrestrials? | 30 |
| 3.Dense matter | * Understanding other environments * Tech advancements * Clean nuclear fusion * Super-strong materials * Quantum computing advancements | * Requires lots of funding and resources. * Study of this requires advanced computational power – still under development | 80 |
| 4.Muon g-2 | * Increase understanding of particles and forces | * Requires lots of funding and resources. * Little short term benefits * If a deviation is discovered – impacts and consequences may still not be known. | 10 |
| 5.Leptoquark | * Grand unified theory * Increase understanding of dark matter * Indirect benefits to materials science, accelerator technology, and medical imaging | * Little short term benefits * Requires lots of funding and resources. * Limited sensitivity. | 30 |
| 6.Precision frontier | * Medical breakthroughs * Advancements in new and improved materials * Advancements in quantum computing and AI | * Requires lots of funding and resources. * Mainly indirect benefits * Potential environmental impact – high-energy experiments | 70 |
| 7.Lepton universality | * New forces or particles? * Validate standard model * Advancement in medical imaging and computing | * Little direct benefits * Requires lots of funding and resources | 30 |
| 8.Cosmological model | * Increased understanding of cosmos * Increased computational methods. * International collaboration | * Limited accessibility – Subaru telescope * Argue that funding could go towards healthcare or climate change instead. * Light pollution concerns * Limited observational window | 20 |
| 9.Cosmic microwave background | * Fundamental understanding * Indirect contribution to high-precision instruments, data analysis, computational methods. | * Little direct benefits * Many will not understand the cost-benefit analysis. * Limited accessibility * Reliance on future missions | 20 |
| 10.Astrobiology | * Deeper understanding of our place in the universe * More knowledge on extremophiles, biosignatures, planet habitability | * Potential misinterpreting of biosignatures could lead to false conclusions about extraterrestrial life. * Limited funding and infrastructure in place for this field/ | 20 |
| 11.High-energy astrophysics | * More understanding of universe’s nature * Indirect benefits to material science and medical imaging. | * High funding and resource cost * Potential safety concerns | 30 |
| 12.Multi-messenger astronomy | * Allows for deeper investigations into space – such as black hole mergers. * Lead to more theories being tested – deeping understanding | * High funding and resource cost | 10 |
| 13.Quantum computing | * Bringing the world into a new age of computing – with countless indirect benefits * Optimizing AI and machine learning * Drug discovery. * Financial modelling * Cryptography | * Job displacement * Incredibly expensive * Potential ethical problems * Uncertain timeline | 90 |
| 14.Nanomedicine | * Revolutionizing medicine – Targeted drug delivery, early disease detection, regenerative medicine. * Improves sustainability – clean energy, water purification. * Tech advancements | * Long-term health and environmental impacts of nanomaterials are still under investigation. * Potential job displacement | 100 |
| 15.Molecular manufacturing | * Could lead to an abundance of resources. * Will lead to better products. * Tailored medicine and tissue engineering * Clear up pollutants and restore damaged ecosystems. * Help with space exploration | * Job displacement * Could increase social inequality. * Lead to economic disruption | 90 |
| 16.New materials | * Indirect benefits to: Energy, Medicine, Electronics, Transportation, Construction. * Can address global challenges like climate change, water scarcity, and pollution. | * New materials may have unforeseen health and environmental risks. * Heavily dependent on R&D – quite expensive | 90 |
| 17.3D optical displays | * Benefits in entertainment – movies, games. * Improve education and training. * Improve design and visualization. * Also improve medical visualization | * Potential eye strain * Slow progression into mainstream – as lack of readily available 3D content | 30 |
| 18.Photonic integrated circuits | * Enhanced security * Potentially reduced power consumption * Increased bandwidth – faster communication (helps with medical imaging, AI, potentially defense) | * Incredibly technical * Field is limited in members | 50 |
| 19.Plasmonic sensors | * Allows for higher sensitivity. * Label-free detection. * Early disease detection alongside other medical advancements * Environmental monitoring | * Potentially many waste materials – so environmental impact * High cost and technical challenge | 50 |
| 20.Photonic crystals | * Efficient light sources * Optical computing * Metamaterials * Medical advancements: Biosensing, Biophotonics * Energy harvesting | * May be hard to bring the indirect benefits to market. * Could be used for advanced weaponry. | 40 |
| 21.Photovoltaics | * Clean energy * Potentially allow communities to generate their own electricity – reducing energy costs. * Creates new jobs | * Use of large scales of land * May require resource extraction. * Dependance on rare earth elements | 60 |
| 22.Unification of forces | * Higher understanding of the universe * Will have indirect contribution to most fields. | * Highly theoretical * Require large resource investment. * Will have minor impact on life | 10 |
| 23.Unified field / string theory | * Provide explanation for dark matter and energy. * Potentially explore higher dimensions * Be the start to new discoveries | * Highly theoretical * Require large resource investment. * Will have minor impact on life | 10 |
| 24.Exotic materials | * Indirect impact to multiple fields, e.g. better energy production, boost medical advancements, improve sustainability, space exploration. | * New resources could have environmental impacts. * May need to mine. | 30 |
| 25.Climate modelling | * Pre-warn about natural disasters more than currently. * Can detect key areas damaging the climate. * Aid politically, creating strategies for improvement to climate. * Potentially result in international cooperation with tackling climate change | * Models may struggle with local climate, only being able to model regionally / globally. | 90 |
| 26.Automated theory-building | * Accelerate discoveries. * Allows human researchers to focus on other projects / allows researchers to all focus on one project. * Reduces barriers to entry – making research more accessible to individuals with less training / resources | * Black box problem. * Perpetuity bias. * Stifle creativity. * Job displacement. | 60 |
| 27.Personalised medicine | * Improved treatment efficiency * Earlier disease detection and prevention * Reduce healthcare costs. | * May bring questions about date privacy. * Could widen the social inequality gap. | 90 |
| 28.Proton therapy | * Improved cancer treatment – reduced damaged to healthy tissue, more precise targeting, potential dose escalation. * Improved quality of life. | * Limited accessibility * Will not help with treating moving tumors. * Increase treatment time. | 100 |
| 29.MRI-guided radiotherapy | * Minimizing damage to health tissue * Reduction of invasive procedures. * Aids in personalized treatment | * Very costly. * Increased procedural complexity | 80 |
| 30.Radiopharmacruticals | * Early diagnosis, personalized imaging. * Improve therapies for different conditions. * Advance medical research. | * More radiation exposure to patients. * Potential will have extremely low availability in production. * Increase the amount of waste products in the medical field. | 60 |
| 31.Minimally invasive surgery | * Faster recovery – less strain on health service as shorter stay. * Increase the accessibility to surgeries. | * Potentially longer procedure times. * Could have higher costs for the health service. | 60 |
| 32.Telemedicine | * Bridge geographic barriers to healthcare access. * Reduce wait times, expand care options, and reduce healthcare costs. * Enables remote monitoring. | * Could increase misdiagnosis. * Could bring about questions of data privacy. | 70 |
| 33. Gravitational Waves |  |  | 10 |
| 34. Quantum Key Distribution |  |  | 50 |
| 35. Dark Matter / Energy |  |  | 10 |
| 36.Neutron Stars |  |  | 10 |
| 37. Dark Energy Equation of State |  |  | 10 |
| 38. Exoplanet Biosignature |  |  | 10 |
| 39. Exoplanet Imaging |  |  | 10 |
| 40. 2D Materials |  |  | 70 |
| 41. Neural Nanobionics |  |  | 70 |
| 42. Nanoelectronics |  |  | 60 |
| 43. Nanotechnology |  |  | 60 |
| 44. Nanomaterials |  |  | 60 |
| 45. Quantum Photonics |  |  | 60 |
| 46. Integrated Photonics |  |  | 70 |
| 47. Metamaterials |  |  | 50 |
| 48. Plasma Physics |  |  | 50 |
| 49. FLASH Radiotherapy |  |  | 90 |