

Astronomers put together a universal wish list

Where we'll go, what we'll see till 2022

By Dan Vergano
USA TODAY

So what are you doing this decade? Astronomers have decided that they plan to discover alternate Earths and figure out the origins of the first stars, galaxies and black holes.

U.S. astronomers every decade prioritize their goals and the gadgets, spacecraft and telescopes needed to reach them. In the newly released National Research Council report, *New Worlds, New Horizons in Astronomy and Astrophysics*,

headed by Stanford's Roger Blandford, astronomers plot the astrophysics agenda from 2012 to 2022.

"It is a consensus achieved through commitment," involving hundreds of astronomers, says Ralph Cicerone, head of the National Academy of Sciences, which oversaw the report's preparation. Some research topics emerge as winners — exploded stars, called supernovas, and alien planets — while others are pushed to the next decade.

"It is really very hard work," Cicerone says.

The report is the sixth such "decadal survey" for astronomy, weighing astronomers' calls for new telescopes against the reality of federal agency budgets. Past surveys have reliably guided NASA and National Science Foundation spending in astronomy.



New galaxies: Astronomers will be looking for clues within galaxies from the earliest era of stars, such as this majestic face-on spiral galaxy deep in the Coma Cluster, captured by the Hubble Space Telescope.

In the past decade, astronomers have found more than 400 planets orbiting nearby stars, learned that super-massive black holes lurk at the center of most galaxies and determined the age of the universe, about 13.7 billion years.

The report sets as a primary goal learning how the first stars formed, finding the "closest habitable Earth-like planets beyond the solar system," and probing

"dark energy," the mysterious force accelerating expansion of galaxies apart from one another throughout the cosmos.

"So much is going on in astronomy, it's a golden age," says astronomer Catherine Pilachowski of Indiana University in Bloomington. "I think they did a terrific job. Far more than in past reports, they have thought about budgets and how we are actually going to build these projects."

Top survey priorities include:

► The Wide-Field Infrared Survey Telescope (WFIRST) — a \$1.6 billion space telescope to be launched in 2020 that will eyeball exploding stars and gravity-distorted views of galaxies for clues to dark energy, as well as detecting habitable worlds orbiting stars in the center of our Milky Way galaxy. The spacecraft would fly a 10-foot-wide telescope mirror in an orbital path



Artist rendering by LSST Corp./NOAO

New gear: A proposed 8.4-meter Chile-based telescope will survey the entire visible sky deeply in multiple colors every week.

balanced between the gravitational pull of the Earth and sun.

► The Large Synoptic Survey Telescope (LSST) — a \$465 million telescope in Chile that by 2018 would investigate the report's priority areas, as well as "near-Earth" asteroids and dwarf planets beyond Neptune in our own solar system. The telescope would see the entire night sky once every three days.

► New Worlds — a \$4 million-per-year study to design telescopes that will be able to directly see habitable planets detected by missions such as WFIRST and the now-flying Kepler space telescope.

"We've been celebrating the good news all afternoon," says astronomer Kirk Borne of George

Mason University in Fairfax, Va., a member of the LSST team.

"We're putting the universe at your fingertips," he says, noting the telescope's observations, enough data to nightly fill 1 million DVDs, will be made available to the public through sky-watching applications hosted by Google and the Microsoft Corp.

The decadal survey constrained its picks for astronomical priorities under "conservative" budget guidelines provided by federal agencies, Blandford said at a briefing. But the researchers also produced a more "optimistic" budget should extra money arrive as part of the Obama administration goal to double the National Science Foundation budget.

Websites let college students grade the professors instead

Sometimes-harsh raters give 'consumer' service

By Stephanie Steinberg
USA TODAY

Many students dread public speaking and say they only sign up because the class is required. But in Sam Blank's classroom, they find it isn't so terrifying.

"I'm a pretty well-liked person, considering the fact I teach a course

Education that creates fear in people," jokes Blank, 62, a communications professor at the Borough of Manhattan Community College in New York.

Blank is among millions of educators who are praised, glorified — and sometimes verbally torn to shreds — on websites where students go to rate their professors. Luckily, he got a stellar rating: the No. 1 community college professor on the website RateMyProfessors.com.

RateMyProfessors.com, known as RMP, is the front-runner among such sites, with about 1.9 million unique visitors a month, says comScore, which tracks Web traffic. Owned by MTV's college network, mtvU, RMP lists more than 1 million professors from 6,500 schools in the USA, Canada and England. Other smaller such sites include KnowYourProfessor.com and ProfessorPerformance.com.

On RMP, professors are rated on a five-point scale, for overall quality, helpfulness, clarity — and how easy it is to get an A in their class. Students also give chili peppers to professors they consider "hot."

Despite some harsh comments warning others away from professors some raters

didn't like, the website is about "shining a spotlight" on the best professors, mtvU's Carlo DiMarco says. "College students always sought the advice of their peers, friends and family members" about which classes to take, he adds; online, they can seek advice from thousands of voices.

Rodney Kashem recently bought RMP's rival, ProfessorPerformance.com, and has revamped the site. Kashem, 24, a grad student at Dartmouth College, says it's the same as checking hotel ratings before spending money on vacation; students are "customers" who want to make sure their tuition is well spent.

Blank says he didn't know about his top rating on RMP, but when a reporter told him, he said it was "absolutely wonderful. ... Perhaps it's an affirmation of my ability to teach."

Juann Watson, a psychology and mental health professor at Kingsborough Community College in Brooklyn, N.Y., was rated the site's "hottest" professor of the year. Watson, 44, says she's honored to be recognized, but "a chili pepper means nothing at this stage in my life or in my accomplishments."

Ted Coladarci, director of institutional research at the University of Maine, has studied how closely RMP's ratings align with the teacher evaluations students write at the end of courses, and he says there's a strong correlation. His findings were published in the journal *Practical Assessment, Research & Evaluation*.

But he cautions that students motivated to go online to rate a professor do not necessarily share the same opinions as everyone who took the class. "An instructor's RMP ratings tend to derive from an exceedingly small and arguably biased sample of all students the instructor has had," he says.



Blank: No. 1.



Watson: Hot prof.

Childhood trauma stays with you

It can hurt health, shorten life span

By Sharon Jayson
USA TODAY

SAN DIEGO — Growing up in a troubled home can cut your life short or lead to a host of health problems later on, according to studies presented over the weekend at the American Psychological Association meeting.

In several major presentations, researchers outlined evidence that weathering difficulties as a child can set your health on the wrong course decades later.

"Our latest research shows that those reporting multiple adversities could shorten their life span by seven to 15 years," says Janice Kiecolt-Glaser, a health psychologist at the Ohio State University College of Medicine. "What we have is clear evidence that adverse childhood experience may have lasting, measurable consequences." Such events include losing a parent, being abused or witnessing parental marital strife, which can lead to inflammation and cell aging much earlier than those who haven't had such strife, she says.

The research methods

Researchers analyzed depression and childhood trauma in a sample of 132 healthy older adults to see how negative emotions and stressful experiences affect biochemical markers of stress such as telomeres — the ends of strands of DNA. Shorter telomeres have been linked with aging, age-related diseases and death.

Participants completed questionnaires on depression; past child abuse or neglect; a parent's death during childhood; witnessing severe marital problems; growing up with a family

"What we're finding is there's something about the early experience of being abused as a child that appears to change the way our brains recognize and learn about emotion."

— Psychologist Seth Pollak



Illustration by Suzy Parker, USA TODAY

member suffering from mental illness or alcohol abuse; or lacking a close relationship with at least one adult.

"We found that childhood adversity was associated with shorter telomeres and increased levels of inflammation," Kiecolt-Glaser says. "Inflammation over time can lead to cardiovascular disease, osteoporosis, arthritis, type 2 diabetes and certain cancers."

In the sample, 32% reported some form of abuse — physical, emotional or sexual — during childhood; 68% reported no such abuse; 44% reported no childhood adversities; 33% reported one; and 24% reported multiple adversities. Those who had two or more adversities had significantly shorter telomere length than those who reported none. The differences researchers measured "could thus translate into a seven- to 15-year difference in life span," the study concludes.

University of Wisconsin-Madison psychologist Seth Pollak also presented his work on childhood adversity, focusing on hormones and brain imaging among those who experienced child abuse, neglect or poverty.

"We know there are all sorts of problems associated with adults who have been abused as children," he says. "What we don't know is why. What is happening early in life that is changing things in the developing brain that is leading to these social and health and interpersonal problems lat-

er in the life?

"What we're finding is there's something about the early experience of being abused as a child that appears to change the way our brains recognize and learn about emotion."

Effects of economic status

Such troubled childhoods can harm later health and, in particular, lead to heart disease, says Karen Matthews, a professor of psychiatry and epidemiology at the University of Pittsburgh, who also presented research on childhood adversity at the convention.

Heightened reactivity to adverse childhood experiences, such as lower socioeconomic status, isolation and negative events, can affect the development of disease, she says.

In her latest study, 212 teens ages 14-16 were monitored over three years to gauge the effect of poverty on sensitivity to stress and early signs of heart disease. Findings showed that years later, those from poor economic households had stiffer arteries and higher blood pressure as well as more thickening of their carotid artery walls.

The adolescent years are a critical time when stress has more impact, Matthews says, perhaps "because of their hormonal changes and their sensitivity to peer rejection, acceptance and how they interpret others' attitudes toward themselves," she says.

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