black holes could also be a major part of the universe's diffuse x-ray background, say Di Matteo and Allen, although Fabian is not so sure. "Here I disagree with my co-authors," he says, noting that most astronomers think very distant active galaxies are the source of the pervasive x-rays. "That's the model I believe in for 6 days of the week."

–GOVERT SCHILLING

Govert Schilling is an astronomy writer in Utrecht, the Netherlands.

CONSERVATION BIOLOGY

Study Sounds Alarm on Yellowstone Grizzlies

Drive through Yellowstone National Park on a late spring day, and there's a good chance you'll see some of its thriving black bears—a young adult foraging near a stream, or a mother with cubs clambering up a hill. But odds are you won't spot a grizzly: Only a few hundred of these elusive animals roam the Yellowstone ecosystem. Just as elusive, however, is whether the grizzly is prospering out of the spotlight. The Interior Department, which runs the park, thinks so, and in June intends to release a strategy for managing the bear after its eventual removal from the threatened species list. Others disagree and are emboldened by a new study suggesting the Yellowstone grizzly is not yet out of the woods and that the government's victory declaration may be premature.

Bad news, bear? Scientists disagree over whether Yellowstone's grizzlies remain imperiled.

Wildlife biologists have dueled for years over how many grizzlies inhabit Yellowstone. An accurate census of the reclusive bears is out of the question, so both sides rely in part on estimates of the population's growth rate to determine whether the grizzly can survive without federal protection. Much of the rancor stems from differing interpretations of data on grizzlies tracked by radio or spotted year-round. Using a new model of population dynamics based on field data, ecological modeler Craig Pease of Vermont Law School and David Mattson, a U.S. Geological Survey (USGS) grizzly biologist, estimate that Yellowstone grizzly numbers grew only about 1% a year from 1975 to 1995—much lower than the 5% annual rise over the last decade claimed by Interior. Their report, in this month's issue of *Ecology*, also portends harder times for the grizzlies, thanks to poor yields of whitebark pine seeds, a favorite food. Some experts applaud the work. "I'm absolutely convinced [they] have the right answer," says University of California, Santa Cruz, population biologist Dan Doak.

Interior officials beg to differ. "The population's been going up for some time," says Chris Servheen of Interior's U.S. Fish and Wildlife Service, who's coordinating an evolving agency plan for managing the grizzly after delisting. Still, he says, to help determine whether the population is growing sustainably, Interior has asked a panel of The Wildlife Society—primarily field biologists and resource managers—to review grizzly data and report back in the next few months.

In the 1800s, up to 100,000 grizzlies roamed the lower 48 United States, scientists estimate; less than 1000, it appears, were left by 1975. For decades, rangers tolerated bears feeding at garbage pits. Enlightened managers stopped these practices in the early 1970s, hoping to reduce maulings and allow the bears to lead a more natural life. But scores of bears, unable to break the habit of looking for handouts or snatching sheep, were killed. In 1975, the government put the remaining grizzlies on the threatened list.

Pease and Mattson began examining grizzly numbers around 1992, after obtaining Interior monitoring data on 202 radio-collared bears it had tracked since 1975. The duo folded these data into a model of births and deaths that takes into account factors—such as age, sex, and whitebark pine yield—that influence bear survival. They also corrected for a problem they claim was overlooked in previous studies: Bears collared in the backwoods for research are less likely to pose a problem to humans and be shot; thus, any population growth estimate based only on data for these bears is likely to be inflated, Pease says.

Some scientists dispute this analysis. The model is "way too complex for the available data," says ecologist Mark Boyce of the University of Wisconsin, Stevens Point, who coauthored studies finding a 5% rise. "There are so many different sources that point to the population increasing, it's almost incomprehensible that these guys could claim that the bears haven't increased." For example, counts of females with new cubs in 1996 were the highest since 1959. And grizzlies, which stake out large territories, appear to be pushing southward and eastward. "Bears are occupying habitat where they haven't been for the last 40 or 50 years," says Servheen.

Pease dismisses the cub counts as "biased and ad hoc." He speculates that bears may be straying farther from the park because a scarcity of whitebark pine is forcing them to forage at lower elevations. In addition, nobody has explored whether the 1988 fires forced bears to shift their ranges or made them otherwise easier to spot, grizzly modeling pioneer Mark Shaffer of Defenders of Wildlife noted in *Science* last week (p. 433).

Even if optimistic population estimates are accurate, the grizzlies may face a hard road. A disease called blister rust is devastating the whitebark pine, Pease and Mattson note. Other grizzly food sources are declining, too. Cutthroat trout, which the bears fish out of streams during spawning, are getting eaten up by lake trout, and park managers are shooting bison and collecting the carcasses (instead of leaving them for bears) to avoid the spread of brucellosis to cattle. "The number of bears is unlikely to grow unless we can close roads and restrict hunting and grazing," says Pease. Removing the grizzly from the endangered list at this time, Boyce adds, "doesn't make a lot of sense."

Servheen says Interior is forging ahead with its management plan but is keeping an open mind on the delisting, pending The Wildlife Society's report. In the meantime, he says, a USGS tracking study could yield a better ballpark number of grizzlies by summer. "If the status is good, we should celebrate that and move on to other problems," says Shaffer. "If it hasn't recovered, we need to get back to work."

–JOCELYN KAISER

PARTICLE PHYSICS

Italy's KLOE Sets Sights on CP Violation

NAPLES, ITALY—The titans of the particle physics world, the CERN laboratory near Geneva and Fermilab near Chicago, are racing to confirm that matter and antimatter are not always completely equivalent—in technical parlance, they are searching for violation of CP symmetry. But at Frascati, south of Rome, a more modest outfit hopes to rob them of that prize. Last week, this upstart machine, called KLOE, recorded its first real data. KLOE is a new detector purpose-built to look for CP violation in particles produced by DAFNE, Italy's new electron-positron collider at the National Institute for Nuclear Physics (INFN).

In contrast to its bigger particle-smashing cousins, INFN aims to make a virtue of its low-energy status by producing events that are cleaner and recording them more completely. To achieve that, KLOE has the world's largest drift chamber—where the

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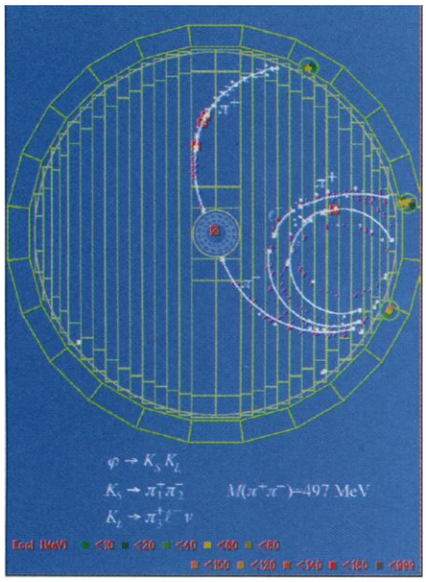

A matter of imbalance. KLOE's first K-short K-long event.

CREDITS: (LEFT TO RIGHT) INFN; ANNA COPLET/BLACK STAR

tracks of particles are recorded—surrounded by a calorimeter to measure their energy and a huge 6-meter superconducting solenoid, which bends the paths of charged particles. "Essentially it is a very simple detector, but very large and very precise," says Juliet Lee-Franzini, physics leader at INFN.

The hunt for a matter-antimatter imbalance was sparked in 1964 by Val Fitch and James Cronin. They were studying the neutral kaon, a short-lived particle that cannot decide whether it is matter or antimatter—it switches continually between the two states. Fitch and Cronin, in collisions at Brookhaven National Laboratory on Long Island, found that for a small fraction of neutral kaons the "mixing" between particle and antiparticle followed a different path, resulting in different decay products. This suggested a breakdown of so-called "charge-parity symmetry" and became known as "indirect" CP violation because the CP violation takes place in the "mixing" and not in the decay itself. In the late 1980s, researchers at CERN detected the first hints of "direct" CP violation, in which some kaons and their antiparticles decayed in different ways. Those hints were strengthened earlier this year when the KTeV group at Fermilab made the first clear observation of direct CP violation in kaons produced by colliding protons (*Science*, 5 March, p. 1428). And another CERN group, the NA48 collaboration, is now analyzing data in search of CP violation.

Despite these high-profile efforts, the researchers at Frascati hope to steal a march using what KTeV co-spokesperson Bruce Winstein of the University of Chicago calls "a completely different way of studying the [neutral kaon] system and CP ... violation." Whereas the Fermilab and CERN groups produce kaons by colliding protons with a fixed target, DAFNE speeds electrons and their antiparticles, positrons, to an energy of 510 million electron-volts in two 100-meter-long rings and collides them inside the KLOE detector. They annihilate and produce short-lived entities called phi particles, which is why DAFNE is sometimes called a "phi factory." The creation of phi particles is normally very rare, but DAFNE is designed to produce them at high rates by using electron and positron beams of very high intensity. The advantage of this relatively low-energy approach is that it produces much less background noise in the detector than higher energy collisions.

The phi particles decay into kaon-antikaon pairs, and KLOE locks onto any pairs of neutral kaons. Each kaon in such a pair has two components, a K-short that decays almost instantaneously into two pions, and a K-long that can travel for several meters before decaying into three pions. This, explains Lee-Franzini, is why KLOE is so large: It can capture the decay of both varieties. About one in 1000 K-long particles should change spontaneously into a K-short, which in turn produces two pions—an indirect CP violation. But the Frascati team will also look for K-long particles that decay directly into two pions instead of three—a direct CP violation. This is predicted to happen once in every one million events.

Paolo Franzini of Rome University, KLOE's spokesperson, says it will take some time to record enough events to get a good fix on CP violation. "For a first measurement, which is of the same accuracy as KTeV, we will need 6 to 9 months of collecting data," he says. To improve on that, "we have to collect at least 500 million events, and so far we have seen five events." Over the next few months, engineers will fine-tune the detector and adjust the energy of the colliding electrons and positrons to produce the maximum number of phi particles. "Our ultimate aim is to collect 50 billion events," says Franzini. This would increase the accuracy to 10 times that of the present KTeV result, a level all three groups will try to achieve. "We have just started, the machine is new, the detector is new, and everything is working very promisingly." **–ALEXANDER HELLEMANS**

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PHYSICS LABS

What Future for France's IN2P3?

PARIS—French physicists are nervously awaiting plans for a major shake-up of French research in nuclear and particle physics. An unpublished report, prepared by particle physicist Jean-Jacques Aubert at the University of the Mediterranean in Marseilles at the request of science minister Claude Allègre, is said to recommend some form of merger between the two main bodies responsible for subatomic physics in France: the National Institute of Nuclear and Particle Physics (IN2P3), which is part of the giant CNRS basic research agency; and the Atomic Energy Commission's (CEA's) Department of Astrophysics, Nuclear Physics, Particle Physics, and Associated Instrumentation (DAPNIA). Although this marriage would be consistent with Allègre's long-stated desire to end duplication of research efforts and enhance scientific collaboration, some physicists argue that it would weaken the role of the CNRS and give the CEA too much influence over research priorities.

Vincent Courtillot, the science ministry's director-general for research, told *Science* that although no final decisions have been made, a "soft merger" between IN2P3 and DAPNIA is the leading candidate among several proposals that have been discussed. Such a union would create a physics powerhouse: IN2P3 employs about 500 researchers in 18 laboratories throughout France, while DAPNIA's 200 physicists work at accelerators and other facilities across Europe and the United States. Both have their headquarters in Paris. Under the "soft merger" plan, the two organizations would come together under single administrative and scientific councils, but physicists would maintain their current status as either CNRS or CEA researchers.

Fears "not warranted." Research director Vincent Courtillot.

Proponents of the merger say that many CNRS and CEA physicists already work closely together and that formalizing this arrangement would strengthen these collaborations and increase efficiency. "The labs often work in common," says Edouard Brézin, president of CNRS's executive board. "If this common work is concretized with a joint scientific council, it would be a good idea." Brézin points to the GANIL heavy-ion accelerator in the northern city of Caen—which is jointly run by the CNRS and CEA—as a model for future collaboration "that works extremely well."

But many physicists are not so sure. IN2P3 researchers are already upset by Allègre's decision not to name a new IN2P3 director when Claude Detraz left the institute's helm last October to take a position at CERN, the European particle physics center near Geneva. Ministry officials have said they do not want to appoint a replacement for Detraz while IN2P3's future is still being discussed, but last month leading CNRS physicists wrote to French Prime Minister Lionel Jospin to protest that the lack of a director was "par-