

Welcome and Overview

Searches for New Forces at the GeV-scale



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How do we look for new particles with
very weak coupling to ordinary
Standard Model matter?

Standard Model fermions are effectively
milli-charged under “dark-force” particles
(dark gauge bosons, axions, ...)

A Rich History

starting with axions, ...

Recently renewed attention due to:

1) suggestive cosmic-ray data ‘excesses’, e.g.

- e^+ at PAMELA
- $e^+ + e^-$ at Fermi, HESS, ...

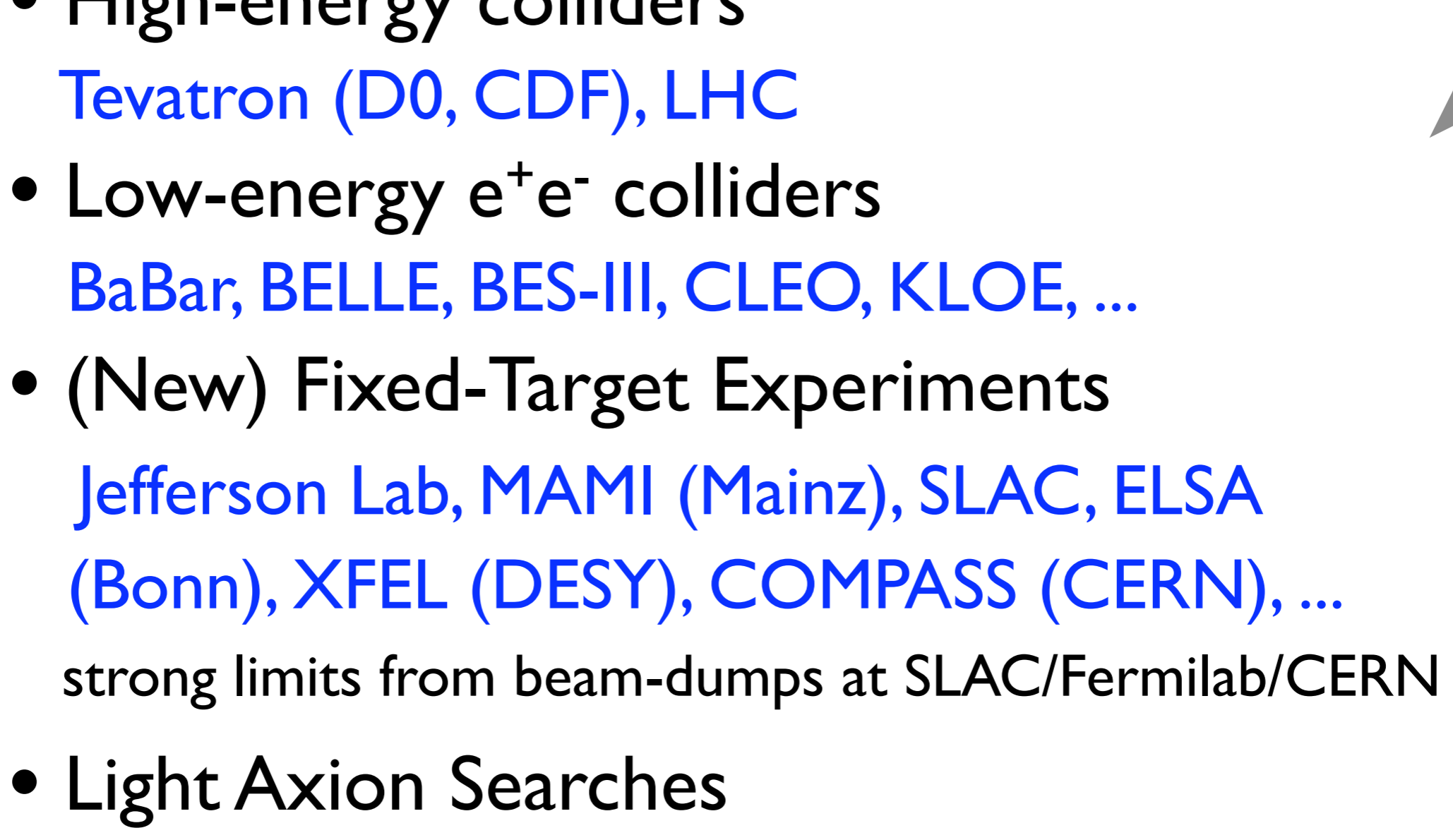
2) DAMA/LIBRA annual modulation

Is Dark Matter interacting with a ‘dark’ force mediated by new $O(\text{GeV})$ scale dark gauge bosons?

Aim of workshop:

Bring together theorists and experimentalists to stimulate progress in searching for 'dark' forces

Experimental Frontiers

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- High-energy colliders
Tevatron (D0, CDF), LHC
 - Low-energy e^+e^- colliders
BaBar, BELLE, BES-III, CLEO, KLOE, ...
 - (New) Fixed-Target Experiments
Jefferson Lab, MAMI (Mainz), SLAC, ELSA
(Bonn), XFEL (DESY), COMPASS (CERN), ...
strong limits from beam-dumps at SLAC/Fermilab/CERN
 - Light Axion Searches
e.g. ADMX (also chameleons, light U(1)s)

Intensity

Energy

Majority of facilities represented at this workshop

Workshop Outline

- **Why new dark forces?**
Dark matter & astrophysics motivation, ...
- **Theory of dark forces**
dark forces and supersymmetry, from string theory, ...
- **Results and constraints from:**
 - high-energy colliders
 - low-energy e^+e^- colliders
 - past beam-dump experiments
 - light axion searches
 - astrophysics (Fermi γ -rays, CMB)

Workshop Outline (ctd.)

New Proposals

- Searches with existing collider data?
 - Proposals for new (fixed-target) experiments?
- ⇒ Main discussion topics in Working Groups

We will consider this workshop a success if it inspires new experiments and analyses

Logistics

- Workshop Dinner
tonight, 7pm at Hunan Garden
please give money (\$35 cash) to Lupe
- Lunch
Th, Fr: at SLAC cafeteria
Sat: catered lunch (cafeteria closed)
please give money (\$15 cash) to Lupe
- Please upload talks to Indico, or send to: 'dark-forces@slac.stanford.edu'



Welcome!