Selected Publications

[1] **Aprile, E.**, C.E. Dahl, L. DeViveiros, R. Gaitskell, K.L. Giboni, J. Kwong, P. Majewski, Kaixuan Ni, T. Shutt, and M. Yamashita. "Simultaneous measurement of ionization and scintillation from nuclear recoils in liquid xenon as target for a dark matter experiment". In: *Phys. Rev. Lett.* 97 (2006), pp. 081302-1–081302-4. DOI: 10.1103/PhysRevLett.97.081302.

This paper presented ionisation and scintillation yields from nuclear recoils in liquid xenon, including the first measurements of the absolute charge yield. This was a crucial foundation for the use of liquid xenon as a target for low-energy recoil measurements. (**142 Citations**).

[2] J. Angle, **Aprile, E.**, et al. (XENON10 Collaboration). "First Results from the XENON10 Dark Matter Experiment at the Gran Sasso National Laboratory". In: *Phys. Rev. Lett.* 100 (2008), pp. 021303-1–021303-5. DOI: 10.1103/PhysRevLett.100.021303.

XENON10 was the first dark matter detector in the XENON family. This paper presented constraints on dark matter that improved on the existing by half an order of magnitude. (**791 Citations**).

[3] E. **Aprile** and T. Doke. "Liquid Xenon Detectors for Particle Physics and Astrophysics". In: *Rev. Mod. Phys.* 82 (2010), pp. 2053–2097. DOI: 10.1103/RevModPhys.82.2053.

[4] **Aprile, E.** et al. (XENON100 Collaboration). "Dark Matter Results from 100 Live Days of XENON100 Data". In: *Phys. Rev. Lett.* 107 (2011), pp. 131302-1–131302-6. DOI: 10.1103/PhysRevLett.107.131302.

This paper presented a search for dark matter with the XENON100 detector. The unprecedented 13 kilogram-year exposure, and low background, with only three candidate events observed, gave an unprecedented sensitivity to dark matter, and the world's best constraints above dark matter masses of $10\ \mathrm{GeV}/c^2$. (**874 Citations**).

[5] **Aprile, E.** et al. (XENON100 Collaboration). "Dark Matter Results from 225 Live Days of XENON100 Data". In: *Phys. Rev. Lett.* 109 (2012), pp. 181301-1–181301-6. DOI: 10.1103/PhysRevLett.109.181301.

Almost doubling the exposure of the previous XENON100 search, this paper also included significant enhancements in the analysis of the data, setting world-leading upper limits on the dark matter-nucleon interaction above $8\ \mathrm{GeV}/c^2$. These stringent constraints also challenged several then much discussed excesses in other dark matter searches. (**1604 Citations**).

[6] **Aprile, E.** et al. (XENON100 Collaboration). "Limits on spin-dependent WIMP-nucleon cross sections from 225 live days of XENON100 data". In: *Phys. Rev. Lett.* 111.2 (2013), pp. 021301-1–021301-5. DOI: 10.1103/PhysRevLett.111.021301.

For models of new physics where the coherently enhanced spin-independent interaction is suppressed, higher-order interactions, including spin-dependent interactions become of interest. This paper presented an analysis of XENON100 data searching for these interactions. For the WIMP-neutron spin-dependent interaction, constraints were improved by an order of magnitude. (**349 Citations**).

[7] **Aprile, E.** et al. (XENON100 Collaboration). "Exclusion of Leptophilic Dark Matter Models using XENON100 Electronic Recoil Data". In: *Science* 349.6250 (2015), pp. 851–854. DOI: 10.1126/science.aab2069.

The XENON detectors are built to detect xenon nuclei recoiling from dark matter scattering. However, dark matter particles much lighter than a xenon atom may deposit more energy when the recoiling particle is an electron. Since electronic recoils are a dominant background for the nuclear recoil search, these electronic recoils are subject to intense modelling and calibration, which was used in this paper to constrain dark matter-electron interactions. The stringent constraints were in strong tension with dark-matter interpretations of the DAMA excess. (**60 Citations**).

[8] **Aprile, E.** et al. (XENON Collaboration). "First Dark Matter Search Results from the XENON1T Experiment". In: *Phys. Rev. Lett.* 119.18 (2017), pp. 181301-1–181301-6. DOI: 10.1103/PhysRevLett.119.181301.

The XENON1T detector, containing 3.2 tonnes of liquid xenon demonstrates the ability of the XENON collaboration and the two-phase TPC technology to scale up the detector by orders of magnitude from the first prototype. This paper presented new, world-leading dark matter constraints even with a short exposure of 34 live days. (**803 Citations**).

[9] **Aprile, E.** et al. (XENON Collaboration). "Dark Matter Search Results from a One Ton-Year Exposure of XENON1T". In: *Phys. Rev. Lett.* 121.11 (2018), pp. 111302-1–111302-8. DOI: 10.1103/PhysRevLett.121.111302.

In this paper, XENON1T presented search result from a total one tonne-year exposure. The radiopurity of the liquid xenon was also unprecedented for this scale and type of detector. These are the current world-leading constraints on dark matter above $6\ \mathrm{GeV}/c^2$. (**720 Citations**).

[10] **Aprile, E.** et al. (XENON Collaboration). "Light Dark Matter Search with Ionization Signals in XENON1T". In: *Phys. Rev. Lett.* 123.25 (2019), pp. 251801-1–251801-8. DOI: 10.1103/PhysRevLett.123.251801.

By using an innovative analysis methodology, this paper was able to perform an analysis of events with only ionisation signals. This allowed XENON1T to probe nuclear recoil energies below the threshold at which scintillation signals are detectable. The results for a range of possible dark matter interactions were competitive or even world-leading for energies typically probed by dedicated solid-state experiments, and was selected as an Editor's Suggestion by Phys. Rev. Letters. (**40 Citations**).

[11] **Aprile, E.** et al. (XENON Collaboration). "Observation of two-neutrino double electron capture in ^{124}Xe with XENON1T". In: *Nature* 568.7753 (2019), pp. 532–535. DOI: 10.1038/s41586-019-1124-4.

The large exposure of XENON1T, the good energy resolution and very low background rate has enabled sources for several non-dark matter rate interactions as well. This paper presented the observation of double-neutrino double electron capture decays of ^{124}Xe, the longest-lived radioactive decay measured directly, with a 1.8×10^{22} y half-life. (**18 Citations**).

[12] **Aprile, E.** et al. (XENON Collaboration). "Search for Light Dark Matter Interactions Enhanced by the Migdal Effect or Bremsstrahlung in XENON1T". In: *Phys. Rev. Lett.* 123.24 (2019), pp. 241803-1–241803-7. DOI: 10.1103/PhysRevLett.123.241803.

[13] E. Aprile et al. (XENON Collaboration). "Observation of Excess Electronic Recoil Events in XENON1T". In: (June 2020). arXiv: 2006.09721 [hep-ex].

Accepted for publication in PRD (**137 Citations**).