ABSTRACT: This document shows the CMS Dark Matter summary plots based on LHCP 2017 results.
1 Vector and Axial-vector Mediators

Figure 1. 95% CL observed and expected exclusion regions in $M_{\text{med}} - m_{\text{DM}}$ plane for di-jet searches and different $E_T$ based DM searches from CMS in the lepto-phobic Axial-vector model. Following the recommendation of the LHC DM working group [1, 2], the exclusions are computed for a universal quark coupling $g_q = 0.25$ and for a DM coupling of $g_{\text{DM}} = 1.0$. It should also be noted that the absolute exclusion of the different searches as well as their relative importance, will strongly depend on the chosen coupling and model scenario. Therefore, the exclusion regions, relic density contours, and unitarity curve shown in this plot are not applicable to other choices of coupling values or model.
Figure 2. 95% CL observed and expected exclusion regions in $M_{\text{med}} - m_{\text{DM}}$ plane for di-jet searches and different $E_T$ based DM searches from CMS in the lepto-phobic Vector model. Following the recommendation of the LHC DM working group [1, 2], the exclusions are computed for a universal quark coupling $g_q = 0.25$ and for a DM coupling of $g_{\text{DM}} = 1.0$. It should also be noted that the absolute exclusion of the different searches as well as their relative importance, will strongly depend on the chosen coupling and model scenario. Therefore, the exclusion regions, relic density contours, and unitarity curve shown in this plot are not applicable to other choices of coupling values or model.
Figure 3. 95% CL observed and expected exclusion regions in $M_{\text{med}} - m_{\text{DM}}$ plane for different $E_T$ based DM searches from CMS in the lepto-phobic Axial-vector model. Following the recommendation of the LHC DM working group [1, 2], the exclusions are computed for a universal quark coupling $g_q = 0.25$ and for a DM coupling of $g_{\text{DM}} = 1.0$. It should also be noted that the absolute exclusion of the different searches as well as their relative importance, will strongly depend on the chosen coupling and model scenario. Therefore, the exclusion regions, relic density contours, and unitarity curve shown in this plot are not applicable to other choices of coupling values or model.
Figure 4. 95% CL observed and expected exclusion regions in $M_{\text{med}} - m_{\text{DM}}$ plane for different $E_T$ based DM searches from CMS in the lepto-phobic Vector model. Following the recommendation of the LHC DM working group [1, 2], the exclusions are computed for a universal quark coupling $g_q = 0.25$ and for a DM coupling of $g_{\text{DM}} = 1.0$. It should also be noted that the absolute exclusion of the different searches as well as their relative importance, will strongly depend on the chosen coupling and model scenario. Therefore, the exclusion regions, relic density contours, and unitarity curve shown in this plot are not applicable to other choices of coupling values or model.
Figure 5. 95% CL observed and expected exclusion regions in $M_{med} - m_{DM}$ plane for di-jet and di-lepton searches from CMS in the Axial-vector model. Following the recommendation of the LHC DM working group [1, 2], the exclusions are computed for a universal quark coupling $g_q = 0.1$, lepton coupling $g_l = 0.1$, and for a DM coupling of $g_{DM} = 1.0$. It should also be noted that the absolute exclusion of the different searches as well as their relative importance, will strongly depend on the chosen coupling and model scenario. Therefore, the exclusion regions, relic density contours, and unitarity curve shown in this plot are not applicable to other choices of coupling values or model.
Figure 6. 95% CL observed and expected exclusion regions in $M_{\text{med}} - m_{\text{DM}}$ plane for di-jet and di-lepton searches from CMS in the Vector model. Following the recommendation of the LHC DM working group [1, 2], the exclusions are computed for a universal quark coupling $g_{q} = 0.1$, lepton coupling $g_{l} = 0.01$, and for a DM coupling of $g_{\text{DM}} = 1.0$. It should also be noted that the absolute exclusion of the different searches as well as their relative importance, will strongly depend on the chosen coupling and model scenario. Therefore, the exclusion regions, relic density contours, and unitarity curve shown in this plot are not applicable to other choices of coupling values or model.
2 Scalar and Pseudoscalar Mediators

Figure 7. 95% CL observed (full-line) and expected (dashed-line) exclusion limits for the Scalar model as a function of $M_{\text{med}}$ for different $E_T$ based DM searches from CMS. Following the recommendation of the LHC DM working group [1, 2], the exclusions are computed for quark coupling $g_q = 1.0$ and for a DM coupling of $g_{\text{DM}} = 1.0$. It should be noted that an exclusion away from $\sigma/\sigma_{\text{theory}} \approx 1$ only applies to coupling combinations that yield the same kinematic distributions as the benchmark model considered here.
Figure 8. 95% CL observed (full-line) and expected (dashed-line) exclusion limits for the Pseudoscalar model as a function of $M_{\text{med}}$ for different $E_T$ based DM searches from CMS. Following the recommendation of the LHC DM working group [1, 2], the exclusions are computed for quark coupling $g_q = 1.0$ and for a DM coupling of $g_{\text{DM}} = 1.0$. It should be noted that an exclusion away from $\sigma/\sigma_{\text{theory}} \approx 1$ only applies to coupling combinations that yield the same kinematic distributions as the benchmark model considered here.
3 Limits translated into the Direct Detection planes

Figure 9. A comparison of CMS results to the $m_{\text{DM}}$–$\sigma_{\text{SD}}$ plane. Unlike in the mass-mass plane, the limits are shown at 90% CL. The CMS contour in the SD plane is for an Axial-vector mediator, Dirac DM and couplings $g_\text{q} = 0.25$ and $g_{\text{DM}} = 1.0$. The SD exclusion contour is compared with limits from PICASSO and PICO experiments, the IceCube limit for the $t\bar{t}$, $b\bar{b}$ annihilation channels, and the Super-Kamiokande limit for the $b\bar{b}$ annihilation channel. It should be noted that the CMS limits do not include a constraint on the relic density and also the absolute exclusion of the different CMS searches as well as their relative importance will strongly depend on the chosen coupling and model scenario. Therefore, the shown CMS exclusion regions in this plot are not applicable to other choices of coupling values or models.
Figure 10. A comparison of CMS results to the $m_{DM}$–$\sigma_{SI}$ plane. Unlike in the mass-mass plane, the limits are shown at 90% CL. The CMS contour in the SI plane is for a Vector mediator, Dirac DM and couplings $g_q = 0.25$ and $g_{DM} = 1.0$. The CMS SI exclusion contour is compared with the LUX 2016, PandaX-II 2016, CDMSLite 2015 and CRESST-II 2015 limits, which constitutes the strongest documented constraints in the shown mass range. It should be noted that the CMS limits do not include a constraint on the relic density and also the absolute exclusion of the different CMS searches as well as their relative importance will strongly depend on the chosen coupling and model scenario. Therefore, the shown CMS exclusion regions in this plot are not applicable to other choices of coupling values or models.

References