

# CMS Physics Publications

May 13, 2020

- 935. Dependence of inclusive jet production on the anti- $k_T$  distance parameter in pp collisions at  $\sqrt{s} = 13$  TeV,  
Submitted to JHEP, arXiv:2005.05159.
- 934. Observation of the  $B_s^0 \rightarrow X(3872)\phi$  decay,  
Submitted to PRL, arXiv:2005.04764.
- 933. Combination of the W boson polarization measurements in top quark decays using ATLAS and CMS data at  $\sqrt{s} = 8$  TeV,  
Submitted to JHEP, arXiv:2005.03799.
- 932. Measurements of production cross sections of WZ and same-sign WW boson pairs in association with two jets in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
Submitted to PLB, arXiv:2005.01173.
- 931. Measurement of CKM matrix elements in single top quark  $t$ -channel production in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
Submitted to PLB, arXiv:2004.12181.
- 930. Search for disappearing tracks in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
Submitted to PLB, arXiv:2004.05153.
- 929. Measurement of quark- and gluon-like jet fractions using jet charge in PbPb and pp collisions at 5.02 TeV,  
Submitted to JHEP, arXiv:2004.00602.
- 928. The production of isolated photons in PbPb and pp collisions at  $\sqrt{[b]s_{NN}} = 5.02$  TeV,  
Submitted to JHEP, arXiv:2003.12797.
- 927. Measurements of  $t\bar{t}H$  production and the CP structure of the Yukawa interaction between the Higgs boson and top quark in the diphoton decay channel,  
Submitted to PRL, arXiv:2003.10866.
- 926. Measurement of the cross section for  $t\bar{t}$  production with additional jets and b jets in pp collisions at  $\sqrt{s} = 13$  TeV,  
Submitted to JHEP, arXiv:2003.06467.

- 925. Study of central exclusive  $\pi^+\pi^-$  production in proton-proton collisions at  $\sqrt{s} = 5.02$  and 13 TeV,  
Submitted to EPJC, arXiv:2003.02811.
- 924. Measurement of single-diffractive dijet production in proton-proton collisions at  $\sqrt{s} = 8$  TeV with the CMS and TOTEM experiments,  
Submitted to EPJC, arXiv:2002.12146.
- 923. Measurement of the cross section for electroweak production of a Z boson, a photon and two jets in proton-proton collisions at  $\sqrt{s} = 13$  TeV and constraints on anomalous quartic couplings,  
Accepted by JHEP, arXiv:2002.09902.
- 922. Measurement of the  $\Upsilon(1S)$  pair production cross section and search for resonances decaying to  $\Upsilon(1S)\mu^+\mu^-$  in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
Submitted to PLB, arXiv:2002.06393.
- 921. A measurement of the Higgs boson mass in the diphoton decay channel,  
PLB 805 (2020) 135425, arXiv:2002.06398.
- 920. Search for physics beyond the standard model in events with jets and two same-sign or at least three charged leptons in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
Submitted to EPJC, arXiv:2001.10086.
- 919. Search for charged Higgs bosons decaying into a top and a bottom quark in the all-jet final state of pp collisions at  $\sqrt{s} = 13$  TeV,  
Submitted to JHEP, arXiv:2001.07763.
- 918. Measurement of the associated production of a Z boson with charm or bottom quark jets in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
Submitted to PRD, arXiv:2001.06899.
- 917. Study of excited  $\Lambda_b^0$  states decaying to  $\Lambda_b^0\pi^+\pi^-$  in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
PLB 803 (2020) 135345, arXiv:2001.06533.
- 916. Search for an excited lepton that decays via a contact interaction to a lepton and two jets in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
Accepted by JHEP, arXiv:2001.04521.
- 915. A deep neural network to search for new long-lived particles decaying to jets,  
Accepted by MLST, arXiv:1912.12238.
- 914. Measurement of the top quark forward-backward production asymmetry and the anomalous chromoelectric and chromomagnetic moments in pp collisions at  $\sqrt{s} = 13$  TeV,  
Submitted to JHEP, arXiv:1912.09540.

- 913. Search for direct top squark pair production in events with one lepton, jets, and missing transverse momentum at 13 TeV with the CMS experiment,  
Accepted by JHEP, arXiv:1912.08887.
- 912. Measurement of the  $\chi_{c1}$  and  $\chi_{c2}$  polarizations in proton-proton collisions at  $\sqrt{s} = 8$  TeV,  
PRL 124 (2020) 162002, arXiv:1912.07706.
- 911. A deep neural network for simultaneous estimation of b jet energy and resolution,  
Accepted by CSBS, arXiv:1912.06046.
- 910. Search for a narrow resonance lighter than 200 GeV decaying to a pair of muons in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
PRL 124 (2020) 131802, arXiv:1912.04776.
- 909. Determination of the strong coupling constant  $\alpha_S(m_Z)$  from measurements of inclusive  $W^\pm$  and  $Z$  boson production cross sections in proton-proton collisions at  $\sqrt{s} = 7$  and 8 TeV,  
Accepted by JHEP, arXiv:1912.04387.
- 908. A search for the standard model Higgs boson decaying to charm quarks,  
JHEP 03 (2020) 131, arXiv:1912.01662.
- 907. Search for a heavy Higgs boson decaying to a pair of W bosons in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
JHEP 03 (2020) 034, arXiv:1912.01594.
- 906. Measurement of the top quark pair production cross section in dilepton final states containing one  $\tau$  lepton in pp collisions at  $\sqrt{s} = 13$  TeV,  
JHEP 02 (2020) 191, arXiv:1911.13204.
- 905. Search for lepton flavour violating decays of a neutral heavy Higgs boson to  $\mu\tau$  and  $e\tau$  in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
JHEP 03 (2020) 103, arXiv:1911.10267.
- 904. Search for supersymmetry in pp collisions at  $\sqrt{s} = 13$  TeV with  $137 \text{ fb}^{-1}$  in final states with a single lepton using the sum of masses of large-radius jets,  
PRD 1010 (2020) 052010, arXiv:1911.07558.
- 903. Search for physics beyond the standard model in multilepton final states in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
JHEP 03 (2020) 051, arXiv:1911.04968.
- 902. Search for high mass dijet resonances with a new background prediction method in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
Accepted by JHEP, arXiv:1911.03947.
- 901. Search for dijet resonances using events with three jets in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
PLB 805 (2020) 135448, arXiv:1911.03761.

- 900. Observation of the  $\Lambda_b^0 \rightarrow J/\psi \Lambda \phi$  decay in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
PLB 802 (2020) 135203, arXiv:1911.03789.
- 899. Measurement of the jet mass distribution and top quark mass in hadronic decays of boosted top quarks in pp collisions at  $\sqrt{s} = 13$  TeV,  
Accepted by PRL, arXiv:1911.03800.
- 898. Search for new neutral Higgs bosons through the  $H \rightarrow ZA \rightarrow \ell^+ \ell^- b \bar{b}$  process in pp collisions at  $\sqrt{s} = 13$  TeV,  
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- 897. Studies of charm quark diffusion inside jets using PbPb and pp collisions at  $\sqrt{[b]s_{NN}} = 5.02$  TeV,  
Submitted to PRL, arXiv:1911.01461.
- 896. Search for top squark pair production in a final state with two tau leptons in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
JHEP 02 (2020) 015, arXiv:1910.12932.
- 895. Measurement of properties of  $B_s^0 \rightarrow \mu^+ \mu^-$  decays and search for  $B^0 \rightarrow \mu^+ \mu^-$  with the CMS experiment,  
JHEP 04 (2020) 188, arXiv:1910.12127.
- 894. Search for a heavy pseudoscalar Higgs boson decaying into a 125 GeV Higgs boson and a Z boson in final states with two tau and two light leptons at  $\sqrt{s} = 13$  TeV,  
JHEP 03 (2020) 065, arXiv:1910.11634.
- 893. Bose-Einstein correlations of charged hadrons in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
JHEP 03 (2020) 014, arXiv:1910.08815.
- 892. Mixed higher-order anisotropic flow and nonlinear response coefficients of charged particles in PbPb collisions at  $\sqrt{[b]s_{NN}} = 2.76$  and 5.02 TeV,  
Accepted by EPJC, arXiv:1910.08789.
- 891. Strange hadron production in pp and pPb collisions at  $\sqrt{[b]s_{NN}} = 5.02$  TeV,  
Accepted by PRC, arXiv:1910.04812.
- 890. Study of  $J/\psi$  meson production from jet fragmentation in pp collisions at  $\sqrt{s} = 8$  TeV,  
PLB 804 (2020) 135409, arXiv:1910.01686.
- 889. Search for supersymmetry with a compressed mass spectrum in events with a soft  $\tau$  lepton, a highly energetic jet, and large missing transverse momentum in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
PRL 124 (2020) 041803, arXiv:1910.01185.
- 888. Running of the top quark mass from proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
PLB 803 (2020) 135263, arXiv:1909.09193.

- 887. Evidence for WW production from double-parton interactions in proton-proton collisions at  $\sqrt{s} = 13$  TeV, EPJC 80 (2020) 41, arXiv:1909.06265.
- 886. Search for long-lived particles using delayed photons in proton-proton collisions at  $\sqrt{s} = 13$  TeV, PRD 100 (2019) 112003, arXiv:1909.06166.
- 885. Measurement of the  $t\bar{t}b\bar{b}$  production cross section in the all-jet final state in pp collisions at  $\sqrt{s} = 13$  TeV, PLB 803 (2020) 135285, arXiv:1909.05306.
- 884. Search for electroweak production of a vector-like T quark using fully hadronic final states, JHEP 01 (2020) 036, arXiv:1909.04721.
- 883. Search for low mass vector resonances decaying into quark-antiquark pairs in proton-proton collisions at  $\sqrt{s} = 13$  TeV, PRD 100 (2019) 112007, arXiv:1909.04114.
- 882. Measurements of differential Z boson production cross sections in proton-proton collisions at  $\sqrt{s} = 13$  TeV, JHEP 12 (2019) 061, arXiv:1909.04133.
- 881. Searches for physics beyond the standard model with the  $M_{T2}$  variable in hadronic final states with and without disappearing tracks in proton-proton collisions at  $\sqrt{s} = 13$  TeV, EPJC 80 (2020) 3, arXiv:1909.03460.
- 880. Search for a charged Higgs boson decaying into top and bottom quarks in proton-proton collisions at  $\sqrt{s} = 13$  TeV in events with electrons or muons, JHEP 01 (2020) 096, arXiv:1908.09206.
- 879. Search for supersymmetry using Higgs boson to diphoton decays at  $\sqrt{s} = 13$  TeV, JHEP 11 (2019) 109, arXiv:1908.08500.
- 878. Search for production of four top quarks in final states with same-sign or multiple leptons in proton-proton collisions at  $\sqrt{s} = 13$  TeV, EPJC 80 (2020) 75, arXiv:1908.06463.
- 877. Search for supersymmetry in proton-proton collisions at 13 TeV in final states with jets and missing transverse momentum, JHEP 10 (2019) 244, arXiv:1908.04722.
- 876. Search for dark photons in decays of Higgs bosons produced in association with Z bosons in proton-proton collisions at  $\sqrt{s} = 13$  TeV, JHEP 10 (2019) 139, arXiv:1908.02699.
- 875. Measurement of the average very forward energy as a function of the track multiplicity at central pseudorapidities in proton-proton collisions at  $\sqrt{s} = 13$  TeV, EPJC 79 (2019) 893, arXiv:1908.01750.

- 874. Search for dark matter particles produced in association with a Higgs boson in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
JHEP 03 (2020) 025, arXiv:1908.01713.
- 873. Search for heavy Higgs bosons decaying to a top quark pair in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
JHEP 04 (2020) 171, arXiv:1908.01115.
- 872. Search for direct pair production of supersymmetric partners to the  $\tau$  lepton in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
EPJC 80 (2020) 189, arXiv:1907.13179.
- 871. Measurement of top quark pair production in association with a Z boson in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
JHEP 03 (2020) 056, arXiv:1907.11270.
- 870. Measurement of differential cross sections and charge ratios for  $t$ -channel single top quark production in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
Accepted by EPJC, arXiv:1907.08330.
- 869. Search for anomalous triple gauge couplings in WW and WZ production in lepton + jet events in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
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- 868. Measurements of triple-differential cross sections for inclusive isolated-photon+jet events in pp collisions at  $\sqrt{s} = 8$  TeV,  
EPJC 79 (2019) 969, arXiv:1907.08155.
- 867. Search for light pseudoscalar boson pairs produced from decays of the 125 GeV Higgs boson in final states with two muons and two nearby tracks in pp collisions at  $\sqrt{s} = 13$  TeV,  
PLB 800 (2019) 135087, arXiv:1907.07235.
- 866. Search for physics beyond the standard model in events with overlapping photons and jets,  
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- 865. Study of the  $B^+ \rightarrow J/\psi \bar{\Lambda} p$  decay in proton-proton collisions at  $\sqrt{s} = 8$  TeV,  
JHEP 12 (2019) 100, arXiv:1907.05461.
- 864. Measurement of the top quark polarization and  $t\bar{t}$  spin correlations using dilepton final states in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
PRD 100 (2019) 072002, arXiv:1907.03729.
- 863. Search for MSSM Higgs bosons decaying to  $\mu^+\mu^-$  in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
PLB 798 (2019) 134992, arXiv:1907.03152.
- 862. Measurement of the top quark Yukawa coupling from  $t\bar{t}$  kinematic distributions in the lepton+jets final state in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
PRD 100 (2019) 072007, arXiv:1907.01590.

- 861. Combined search for supersymmetry with photons in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
PLB 801 (2020) 135183, arXiv:1907.00857.
- 860. Search for pair production of vector-like quarks in the fully hadronic final state,  
PRD 100 (2019) 072001, arXiv:1906.11903.
- 859. Search for long-lived particles using nonprompt jets and missing transverse momentum with proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
PLB 797 (2019) 134876, arXiv:1906.06441.
- 858. A multi-dimensional search for new heavy resonances decaying to boosted WW, WZ, or ZZ boson pairs in the dijet final state at 13 TeV,  
EPJC 80 (2020) 237, arXiv:1906.05977.
- 857. Search for the production of four top quarks in the single-lepton and opposite-sign dilepton final states in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
JHEP 11 (2019) 082, arXiv:1906.02805.
- 856. Production of  $\Lambda_c^+$  baryons in proton-proton and lead-lead collisions at  $\sqrt{[b]s_{\text{NN}}} = 5.02$  TeV,  
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- 855. Combination of CMS searches for heavy resonances decaying to pairs of bosons or leptons,  
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- 854. Search for supersymmetry with a compressed mass spectrum in the vector boson fusion topology with 1-lepton and 0-lepton final states in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
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- 853. Search for vector-like leptons in multilepton final states in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
PRD. 100 (2019) 052003, arXiv:1905.10853.
- 852. Search for Higgs and Z boson decays to  $J/\psi$  or  $\Upsilon$  pairs in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
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- 851. Search for low-mass quark-antiquark resonances produced in association with a photon at  $\sqrt{s} = 13$  TeV,  
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- 850. Correlations of azimuthal anisotropy Fourier harmonics in pPb collisions at  $\sqrt{[b]s_{\text{NN}}} = 8.16$  TeV,  
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- 849. Search for a light charged Higgs boson decaying to a W boson and a CP-odd Higgs boson in final states with  $e\mu\mu$  or  $\mu\mu\mu$  in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
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- 848. Search for anomalous electroweak production of vector boson pairs in association with two jets in proton-proton collisions at 13 TeV, PLB 798 (2019) 134985, arXiv:1905.07445.
- 847. Search for the production of  $W^\pm W^\pm W^\mp$  events at  $\sqrt{s} = 13$  TeV, PRD 100 (2019) 012004, arXiv:1905.04246.
- 846. Observation of nuclear modifications in  $W^\pm$  boson production in pPb collisions at  $\sqrt{[b]s_{\text{NN}}} = 8.16$  TeV, PLB 800 (2020) 135048, arXiv:1905.01486.
- 845. Multiparticle correlation studies in pPb collisions at  $\sqrt{[b]s_{\text{NN}}} = 8.16$  TeV, PRC 101 (2020) 014912, arXiv:1904.11519.
- 844. Measurement of  $t\bar{t}$  normalised multi-differential cross sections in pp collisions at  $\sqrt{s} = 13$  TeV, and simultaneous determination of the strong coupling strength, top quark pole mass, and parton distribution functions, Accepted by EPJC, arXiv:1904.05237.
- 843. Search for resonances decaying to a pair of Higgs bosons in the  $b\bar{b}q\bar{q}'\ell\nu$  final state in proton-proton collisions at  $\sqrt{s} = 13$  TeV, JHEP 10 (2019) 125.
- 842. Search for new physics in top quark production in dilepton final states in proton-proton collisions at  $\sqrt{s} = 13$  TeV, EPJC 79 (2019) 886, arXiv:1903.11144.
- 841. Search for a low-mass  $\tau^-\tau^+$  resonance in association with a bottom quark in proton-proton collisions at  $\sqrt{s} = 13$  TeV, JHEP 05 (2019) 210, arXiv:1903.10228.
- 840. Search for supersymmetry in final states with photons and missing transverse momentum in proton-proton collisions at 13 TeV, JHEP 06 (2019) 143, arXiv:1903.07070.
- 839. Constraints on anomalous HVV couplings from the production of Higgs bosons decaying to  $\tau$  lepton pairs, PRD 100 (2019) 112002, arXiv:1903.06973.
- 838. Search for charged Higgs bosons in the  $H^\pm \rightarrow \tau^\pm \nu_\tau$  decay channel in proton-proton collisions at  $\sqrt{s} = 13$  TeV, JHEP 07 (2019) 142, arXiv:1903.04560.
- 837. Measurement of electroweak production of a W boson in association with two jets in proton-proton collisions at  $\sqrt{s} = 13$  TeV, EPJC 80 (2020) 43, arXiv:1903.04040.
- 836. Search for a heavy pseudoscalar boson decaying to a Z and a Higgs boson at  $\sqrt{s} = 13$  TeV, JHEP 06 (2019) 143, arXiv:1903.00941.



- 835. Combinations of single-top-quark production cross-section measurements and  $|f_{LV}V_{tb}|$  determinations at  $\sqrt{s} = 7$  and 8 TeV with the ATLAS and CMS experiments,  
JHEP 05 (2019) 088, arXiv:1902.07158.
- 834. Azimuthal separation in nearly back-to-back jet topologies in inclusive 2- and 3-jet events in pp collisions at  $\sqrt{s} = 13$  TeV,  
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- 833. Pseudorapidity distributions of charged hadrons in xenon-xenon collisions at  $\sqrt{[b]s_{NN}} = 5.44$  TeV,  
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- 832. Measurement of exclusive  $\rho(770)^0$  photoproduction in ultraperipheral pPb collisions at  $\sqrt{[b]s_{NN}} = 5.02$  TeV,  
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- 831. Observation of two excited  $B_c^+$  states and measurement of the  $B_c^+(2S)$  mass in pp collisions at  $\sqrt{s} = 13$  TeV,  
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- 830. Search for W boson decays to three charged pions,  
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- 829. Charged-particle angular correlations in XeXe collisions at  $\sqrt{[b]s_{NN}} = 5.44$  TeV,  
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- 828. Search for supersymmetry in events with a photon, jets, b-jets, and missing transverse momentum in proton-proton collisions at 13 TeV,  
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- 827. Measurement of electroweak WZ boson production and search for new physics in WZ + two jets events in pp collisions at  $\sqrt{s} = 13$  TeV,  
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- 826. Measurements of the  $pp \rightarrow WZ$  inclusive and differential production cross section and constraints on charged anomalous triple gauge couplings at  $\sqrt{s} = 13$  TeV,  
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- 825. Search for dark matter produced in association with a single top quark or a top quark pair in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
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- 824. Search for the pair production of light top squarks in the  $e^\pm\mu^\mp$  final state in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
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- 823. Measurements of the Higgs boson width and anomalous HVV couplings from on-shell and off-shell production in the four-lepton final state,  
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- 822. Measurement of the  $t\bar{t}$  production cross section, the top quark mass, and the strong coupling constant using dilepton events in pp collisions at  $\sqrt{s} = 13$  TeV,  
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- 820. Measurement of the top quark mass in the all-jets final state at  $\sqrt{s} = 13$  TeV and combination with the lepton+jets channel,  
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- 819. Measurement of the differential Drell-Yan cross section in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
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- 818. Search for contact interactions and large extra dimensions in the dilepton mass spectra from proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
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- 817. Search for vector-like quarks in events with two oppositely charged leptons and jets in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
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- 816. Search for a heavy resonance decaying to a top quark and a vector-like top quark in the lepton+jets final state in pp collisions at  $\sqrt{s} = 13$  TeV,  
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- 815. Measurement and interpretation of differential cross sections for Higgs boson production at  $\sqrt{s} = 13$  TeV,  
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- 813. Search for an exotic decay of the Higgs boson to a pair of light pseudoscalars in the final state with two muons and two b quarks in pp collisions at 13 TeV,  
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- 812. Observation of single top quark production in association with a Z boson in proton-proton collisions at  $\sqrt{s} = 13$  TeV,  
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- 810. Measurement of the energy density as a function of pseudorapidity in proton-proton collisions at  $\sqrt{s} = 13$  TeV, EPJC 79 (2019) 391, arXiv:1812.04095.
- 809. Measurement of inclusive very forward jet cross sections in proton-lead collisions at  $\sqrt{[b]s_{NN}} = 5.02$  TeV, JHEP 05 (2019) 043, arXiv:1812.01691.
- 808. A search for pair production of new light bosons decaying into muons in proton-proton collisions at 13 TeV, PLB 796 (2019) 131, arXiv:1812.00380.
- 807. Search for dark matter in events with a leptoquark and missing transverse momentum in proton-proton collisions at 13 TeV, PLB 795 (2019) 76, arXiv:1811.10151.
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